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Skeptical Inquirer

THE MAGAZINE FOR SCIENCE AND REASON

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40TH ANNIVERSARY CELEBRATION PART II

ODYSSEYS IN SCIENTIFIC SKEPTICISM

Eugenie SCOTT
Harriet HALL
Christopher C. FRENCH
Wendy GROSSMAN
Benjamin RADFORD
Susan GERBIC
Richard SAUNDERS
Michael MARSHALL

NUCLEAR POWER and the Psychology of Evaluating Risk

MICHAEL MANN and the Climate Wars

Superstition Masquerading as Science

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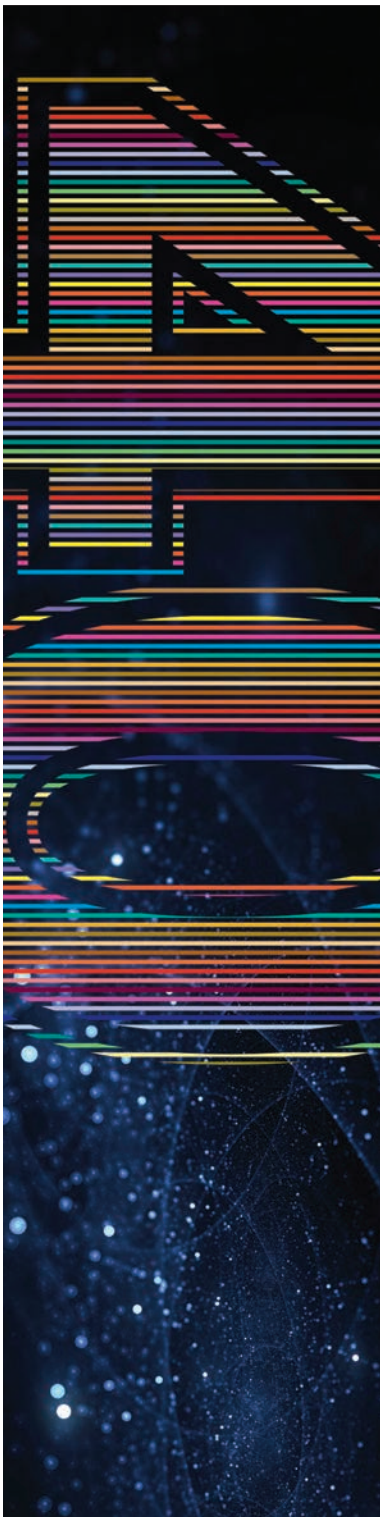

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[FROM THE EDITOR

Skeptics' Odysseys and *Star Trek*'s Voyages

We conclude our fortieth anniversary celebration of the Skeptical Inquirer and the Committee for Skeptical Inquiry with eight invited essays in this issue by noted skeptics collectively labeled "Odysseys in Scientific Skepticism." Eugenie Scott, Harriet Hall, Christopher French, Wendy Grossman, Ben Radford, Susan Gerbic, Richard Saunders, and Michael Marshall share their personal journeys into scientific skepticism. I think you'll be impressed with the many different paths they found. Following that, we present a detailed update of the CSI(COP) historical timeline. Preparing it, I was surprised how much has happened in the past twenty years.

* * *

Our first feature article about nuclear power is not by a nuclear engineer or a nuclear advocate (or nuclear opponent). It is by a psychologist, Daniel A. Vogel, who began his exploration of this crucial topic by wondering if part of the opposition to nuclear power is psychological—rooted in problems with how we evaluate risk. Our cover article, "Nuclear Power and the Psychology of Evaluating Risk," is the result. I think it is a good first step in helping all of us use the tools of scientific skepticism to understand our own thinking, good and bad, about energy and risk.

* * *

I write this on the day *Star Trek* passed the fifty-year milestone since the first episode aired in 1966. With this anniversary and all the *Star Trek* movies (the thirteenth opened this past summer) and follow-on TV series (the seventh starts in 2017) *Star Trek* is again getting tremendous attention. I saw that first episode when it originally aired on NBC and was immediately hooked by the freshness, originality, optimism, and vision of the series. Not to mention the memorable characters and multiethnic crew, including Spock, the epitome of logic and rationalism. I was soon calling up friends and having them come over to watch the next week's episode. *Star Trek* creator Gene Roddenberry and his writers brought to television an optimistic vision of the future that resonated with me and millions of others. The Apollo program had us on the path to the moon, and all things seemed possible. The new series was a brilliant extension of the science fiction I'd grown up with by Heinlein, Bradbury, Clarke, Asimov, and countless others. It was thoughtful. It was philosophical. It had deep humanity. Like all good science fiction, it raised complex social issues and exposed them in an entirely new light. An example is the episode in which two races on a planet are trying to annihilate each other because they think they are so fundamentally different. One race is black on the left side, white on the right; the other, just the opposite. Our noble characters saw instead only similarities, not differences, and on that point the story progressed.

StarTrek, as science and exploration does generally, gave us a sense of possibilities, of a future better and more exciting and awe-inspiring than we knew. I think we've all lost something of that sense, and I think it is important we get it back. We skeptics embrace science, and that includes not just critical thinking but that adventurous quest for new knowledge and new discoveries that *Star Trek* and its successors so powerfully dramatized.

—Kendrick Frazier

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We continue our fortieth anniversary celebration with essays by eight noted skeptics on their "Odysseys in Scientific Skepticism" and a fifteen-year update of the CSI(COP) timeline. Our feature article considers "Nuclear Power and the Psychology of Evaluating Risk."

Burzynski Update: Texas Hearings End, Judges Sifting Evidence

Robert Blaskiewicz

August 2016 saw the end of arguments in the administrative hearing following disturbing allegations by the Texas Medical Board about Stanislaw Burzynski's Houston cancer clinic. Burzynski, the discoverer, manufacturer, sole U.S. prescriber, and sole U.S. dispenser of a cancer treatment he calls "antineoplastons," has been treating patients with his unproven therapy for forty years. For the past two decades, Burzynski has administered his drug under the auspices of dozens of FDA-approved clinical trials, none of which has been able to answer whether or not antineoplastons are effective. Participation in the trials, which are generally not covered by insurance, can cost patients hundreds of thousands of dollars. (See "The Burzynski Battles: Four Decades of Unproven Cancer Cure Claims," SI, March/April 2014.)

A complaint was filed in December 2013 by the Texas Medical Board following an FDA investigation, which found the clinical trials in a breathtakingly poor state. The original complaint was expanded to some 200 pages of allegations in July of 2014, though they have since been pared down for concision. The Board staff alleged that Burzynski failed to meet the standard of care with nontherapeutic prescribing, abetted the practice of medicine by unlicensed personnel, denied patients informed consent, failed to disclose relevant pharmacy and lab ownership interests to patients, billed improperly and demanded retainers, practiced deceptive marketing, committed a host of failures to protect patients, kept inadequate records, and failed to adhere to protocols in his clinical trials.

The hearing proper began in November 2015, when Board experts who had previously been deposed were cross-examined by Burzynski's lawyers. Numerous Burzynski supporters, including a handful of former patients and their families, attended these hearings and protested outside the State Office of Administrative Hearings, as they have done many times in the past when Burzynski found himself in legal trouble. Just before Christmas 2015, during a planned hiatus before Burzynski put forward his case in January, Burzynski was diagnosed with Acute Coronary Syndrome (99 percent occlusion of one artery, according to his doctor's note to the court). The final leg of the hearing was postponed until May, when Burzynski's legal team made their case.

Final arguments were submitted in writing to the administrative law judges (ALJs) overseeing the hearing. A seventy-five-page limit was placed on these documents. The Board staff asked for a relaxing of the restriction on length, as their revised complaint alone was fifty pages. The closing argument, they argued, would also have to incorporate their evidence, and they bore the burden of proof in the case. The ALJs disagreed and held the page limit to seventy-five. When the final briefs were submitted, the Board held their closing argument proper to seventy-five pages and included eighteen pages of citations and seven appendices—spreadsheets that chronologically listed the dates and types of infractions alleged to have been committed by Burzynski but crucially admitting no evidence that was not already in the record. Burzynski's lawyers moved to have the Board's entire closing argument struck from the record for violating the page-length requirements; the ALJs denied the motion.

The case file closed on August 15. According to transcripts of the hearings, the judges have sixty days to sift through some 75,000 pages of exhibits that were submitted into evidence. When the ALJs issue their findings of fact, those charges will be brought to the Texas Medical Board, which will decide whether or not Burzynski will be allowed to continue to practice medicine. The sheer number of aggravating factors in this long, complex case suggests that the Board staff will seek to strip Burzynski of his license. Disciplinary proceedings against other members of the Burzynski Clinic's staff, three physicians (including Burzynski's son, Greg) and a physician's assistant, are scheduled to begin later this year.

Robert Blaskiewicz is assistant professor of critical thinking and first-year studies at Stockton University. He appears on the live Virtual Skeptics web show (Wednesdays at 8PM EST, virtualskeptics.com) and founded The OTHER Burzynski Patient Group website.

Chemtrails? In First Peer-Reviewed Published Survey, Atmospheric Scientists Say No

Kendrick Frazier

The news undoubtedly won't faze committed "chemtrail" believers who long ago barricaded themselves behind an impenetrable wall of conspiratorial thinking. But the rest of us—including some who may have wondered, just a little bit—now have some authoritative scientific word.

The debate will now no longer be a scientific one, if it ever was, but only a continuing argument among dedicated believers.

What the authors say is the first peer-reviewed expert response from atmospheric scientists about chemtrails—if they existed—has been published in a scientific journal. Specifically, the authors surveyed experts to scientifically evaluate the popular claim, advanced by a small but vocal group of people, that there is a secret large-scale atmospheric program involving widespread chemical spraying from high-altitude aircraft. Not true, the scientists say: there is no such evidence.

The condensation trails, or contrails, of condensed moisture that people see behind high-flying airliners and other aircraft are just that. They aren't "chemtrails."

The debate will now no longer be a scientific one, if it ever was, but only a continuing argument among dedicated believers who, no matter what, won't trust or accept the word of the scientists who should know. The belief in chemtrails seems to parallel increasing public distrust of elites and institutions, as shown in earlier social science research.

Christine Shearer and Steven J. Davis of the Department of Earth System Science at the University of California, Irvine, both also affiliated with the Carnegie Institution of Science, and colleagues Mike West and Ken Caldeira conducted a survey of two groups of experts—atmospheric chemists with expertise in condensation trails and geochemists working on atmospheric deposition of dust and pollution.

Their paper, "Quantifying Expert Consensus against the Existence of a Secret, Large-Scale Atmospheric Spraying Program," was published in the August 10 *Environmental Research Letters* (available online at iopscience.iop.org) and announced in an August 12 news release from UC, Irvine.

Say the authors:

> We find broad scientific consensus against the existence of a secret large-scale atmospheric spraying program. Our goal is not to sway those already convinced that there is a secret, large-scale spraying program—who often reject counter-evidence as further proof of their theories—but rather to establish a source of objective peer-reviewed science that can inform public discourse in the future by seriously addressing the underlying concerns of science, governance, and public trust.

The idea of such a secret spraying program, commonly referred to as "chemtrails," is believed to be true or partly true by 17 percent of people, according to one international survey referenced in the paper. A number of websites promulgate such ideas. Despite the claim's prevalence, there have been few attempts to seriously and scientifically evaluate the conspiracy theory. In 2000, the U.S. Environmental Protection agency, Federal Aviation Administration, NASA, and the National Oceanic and Atmospheric Administration posted a fact sheet to assure the public that the government is not operating such a large-scale spraying system. But until now, no peer-reviewed studies in the scientific literature had addressed the claims.

Shearer, Davis, and colleagues used the ISI Web of Science to identify authors of the most cited peer-reviewed publications covering condensation

trails and atmospheric deposition of dust and particles onto Earth's surface. A total of seventy-seven experts completed the authors' surveys. All were told the survey would be confidential; the paper lists all participants' names and affiliations, but responses aren't attributed to specific experts.

In response to the survey's general question of whether they have ever encountered evidence that indicates the existence of secret large-scale atmospheric spraying programs, seventy-six of the experts responding (98.7 percent) answered no.

They were all shown four photos that believers contend show evidence of chemtrails and asked whether secret, large-scale atmospheric spraying was the simplest explanation. In each case, 100 percent of the respondents answered no. They offered instead a variety of probable scientific explanations. Longer and shorter contrails, for example, can be attributed to different humidity/atmospheric conditions, different altitudes, and so on. Swirling trails can be attributed to wind shear/advection and high-altitude winds, aircraft circling in a holding pattern, or military or acrobatic aircraft flying in looping patterns.

They were also asked about claims of aluminum, barium, and strontium being found in pond sediments or in snow. The most common answers were that the concentrations are typical and of natural origin. Barium, copper, and magnesium in airborne particles could be attributed to industrial pollution or are typical concentrations of natural origin.

They also asked the deposition experts about the advice of one chemtrail website on how nonspecialists can collect samples of surface water to obtain relevant evidence of "aerosol engineering," another name for the chemtrails idea. Most of the experts disagreed or disagreed sharply with the instructions, saying the steps would lead to contamination (and, hence, likely false-positive results).

For the contrail survey, no expert thought he or she had ever come across evidence of a secret, large-scale atmospheric spraying program. None thought any of the four photos in the survey were best explained by chemical spraying.

"Our survey found little agreement in the scientific community with claims that the government, the military, airlines, and others are colluding in a widespread, nefarious program to poison the planet from the skies."

— Steven J. Davis, study coauthor

The study's experts noted that there are more contrails than there used to be. But there has been steady growth in air travel in recent decades, which leads airplanes to fly higher where contrails are more likely to form and remain in the sky. Also, engines are larger and fuel efficiencies better, leading to creation of cooler water vapor.

The authors conclude in their paper:

> While we understand that many of the fears underlying [chemtrail] theories may be legitimate, the evidence as evaluated here does not point to a secret atmospheric spraying program. Changes in aircraft technologies may be causing contrails to persist longer than they used to, and changes in industrial development could potentially be increasing aerosol deposition in some areas. But the focus on a secret, large-scale atmospheric spraying program may be taking attention away from real, underlying problems that need addressing.

"The chemtrails conspiracy theory maps pretty closely to the origin and growth of the internet, where you can still find a number of websites that promote this particular brand of pseudoscience," said study coauthor Davis, an associate professor of Earth system science at UC, Irvine. "Our survey found little agreement in the scientific community with claims that the government, the military, airlines, and others are colluding in a widespread, nefarious program to poison the planet from the skies."

Davis ended with this reasoned assessment: "We don't imagine that we're going to sway the beliefs of hardcore adherents to the chemtrails conspiracy theory with this study. But we thought it was important to go on the record with fundamental scientific facts to refute claims that the government is deliberately spreading harmful chemicals from aircraft."

What's been the reaction? Coauthor Davis told the Skeptical Inquirer: "The response has been expectedly mixed. There have been emails from people calling me names and calling the paper 'junk science,' and there was even someone who'd taken what looked to be a lot of time assessing our methodology, survey wording, and makeup of the group of expert participants. But on the flip side, I've also gotten an even greater number of emails expressing appreciation and gratitude for our taking up the topic and publishing the paper at all, saying they thought it would be useful."

Kendrick Frazier is the editor of the Skeptical Inquirer.

Study Reveals How Witchcraft Harms Economies

Benjamin Radford

Belief in magic is connected to a lack of economic growth in Africa and elsewhere, new research shows. A 2010 Gallup poll found that belief in magic is widespread throughout sub-Saharan Africa, with over half of respondents saying they personally believe in witchcraft. African witch doctors are consulted not only for healing diseases but also for placing blessings on businesses and curses on rivals.

For many Africans, magic is routinely used for personal and financial gain. Belief in magic may seem quaint or harmless, but it can have serious consequences ranging from witch hunts to murder. It harms economies as well.

Belief in magic may seem quaint or harmless, but it can have serious consequences ranging from witch hunts to murder. It harms economies as well.

A new large-scale economics study, the first of its kind, explores witchcraft—defined as the use of the supernatural to harm others or acquire wealth—and its role in the erosion of social capital such as trust. Boris Gershman, an economics professor at American University, examined survey data from nineteen countries in sub-Saharan Africa and found "a robust negative association between the prevalence of witchcraft beliefs and multiple measures of trust."

Trust is an essential ingredient in interpersonal relationships and in economic development; for example, a business owner is unlikely to enter into contracts with others if he or she doesn't trust those partners to fulfill their obligations. Gershman found the same lack of trust in other metrics of social capital, including charitable giving and religious participation.

Gerrie ter Haar, a professor of religion, human rights, and social change, writing in *Imagining Evil: Witchcraft Beliefs and Accusations in Contemporary Africa*, notes:

> Witchcraft, as an ideology and as a practice, is a development issue in the sense that it hampers economic progress as people, afraid of being accused of practicing witchcraft, refrain from any activity that may make them appear more successful in life than others. . . . Fear of witchcraft often inhibits people from undertaking any productive activity in areas where this is often most needed. As a result, ambitious young people will move away and start businesses elsewhere. In South Africa witchcraft accusations are often made against those who initiate development projects or otherwise try to improve their conditions of life.

Throughout much of Africa, being called a "witch" is not merely an insult. In some cases, the mere accusation can lead to ostracism, persecution, or even death at the hands of an angry mob. Women and the elderly are especially vulnerable because they are believed to be more closely associated with black, or malicious, magic than male witches.

And it's not just Africa; Gershman writes:

> Evidence from societies beyond Africa shows that in preindustrial communities where witchcraft is believed to be an important cause of illness, mistrust and other antisocial traits are inculcated since childhood. Furthermore, second-generation immigrants in Europe originating from countries with widespread witchcraft beliefs are generally less trusting.

Gershman suggests that increased education may help solve the problem as a scientific worldview replaces a superstitious one. The research, "Witchcraft Beliefs and the Erosion of Social Capital: Evidence from Sub-Saharan Africa and Beyond," appeared in the May 2016 *Journal of Development Economics*.

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'Ghostly' Image at Haunted Stanley Hotel

Benjamin Radford

A visitor to a famous—and famously haunted—hotel in Colorado claimed to have captured a ghostly image in April 2016. According to an April 18 news story on CNN, "Tourist Henry Yau recently took a picture at the Stanley Hotel in Estes Park, Colorado, which appears to show two ghostly apparitions standing on a staircase. In the photo, a woman can be seen at the top of the stairs in a period outfit with a child beside her."

As expected, several amateur ghost hunters weighed in suggesting it's unexplainable. Others, however, have a pretty good idea of what it is. Researcher Kenny Biddle of the *Geeks & Ghosts* podcast examined the photo and noted that Yau used the panoramic feature on his iPhone to capture a full view of the grand staircase. This is important because in panorama mode, the camera doesn't just take one photo but instead scans across the scene rapidly.

Biddle noted in a Facebook post:

> Panoramic images are not taken in the same fraction of a second as normal images are. They take several seconds . . . which would allow Yau to start taking his panoramic image at one end of the room, and another guest or two to hit the halfway point down the stairs, turn the corner, and begin the second set of stairs to the floor as Yau ends his panoramic image on the other side of the room.

Odd glitches using the panorama function on cameras are common, and many websites display hundreds of bizarre and double images (see, for example, a Tumblr account titled "Panorama Fail"). Biddle notes:

> When looking at a close up of the alleged ghost and second ghost (to the left of the more solid looking figure), we see that the features of both figures match up: the hair, the spaghetti-strap top, the height of the head, shoulders, and the top of the dress. This is a double image of the same person, not someone else. This effect was caused by the low light environment, slower scanning speed due to the camera trying to take in more light, and the movement of this person as they rounded the corner.

Yau claims that he doesn't remember seeing anyone at the top of the staircase when he took the photo, but it's quite possible that he simply didn't notice the woman as she appeared and turned at the top of the stairs, because he was trying to hold the camera steady and take the photo. Upon closer inspection there is nothing remarkable in the image; it's a perfectly ordinary blurry, double image common in long exposure and panoramic iPhone photographs. Had it been taken in any number of other locations, it would not likely have attracted such attention. So why was this image played up as a mystery?

Context plays two roles in the creation of "spooky" photos. Most people routinely take photos that are flawed in some way or that have odd or unusual images in them, including flash reflected "orbs," odd shadows, blurry body parts, double exposures, objects behind people seemingly coming out of their heads, and so on. Usually they are ignored or deleted, unless the photographer (or someone else) decides that there's some reason why the photo might be of something supernatural.

The photo was taken at a doubly famous hotel—not only did it inspire the horror classic *The Shining*, but it's also claimed to be one of the most haunted hotels in the country and promotes itself as a ghost hunting destination. To some degree, we see what we want or expect to see—and that can include ghosts. People who are aware of a building's haunted reputation are more likely to take many photos, and anything odd or even potentially mysterious in those photos is likely to be considered evidence of ghosts. A person could take an equal number of similar odd photos at a location not assumed to be haunted, and the odd photographic artifacts would not be as closely examined or interpreted as anything mysterious, just as flaws in the photos.

The second contextual factor is of course that the Stanley Hotel and others like it have a vested economic interest in promoting such photos as ghostly—or at the very least maintaining an agnostic stance about them. There is no publicity to be gained by casting any doubt on a claimed ghost photo taken in their hotel that's making news.

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Animas River Spill Spawns Conspiracy Theories

Benjamin Radford

On August 5, 2015, contractors working for the U.S. Environmental Protection Agency (EPA) accidentally released about three million gallons of polluted mine wastewater into Colorado's Animas River. The stew of toxic elements temporarily turned the river orange and caused concern for wildlife, farmers, tourism, and those who depend on the river for drinking water. Tests conducted three weeks after the spill found no harmful levels of any contaminants in the river, though many are concerned that the river's sediments may be toxic and remain so for years to come.

Accidents and disasters—especially life-threatening ones, though the Animas spill is not known to have harmed anyone—often spawn conspiracy theories. The most popular theory claims that the EPA purposely polluted the river as a way to obtain extra funding available for cleanup; under this classic "follow the money" scenario, the EPA decided the best way to get free money for Superfund sites—as this could potentially be designated—was to create a disaster. As one typical conspiracy commenter opined (at http://tinyurl.com/okww4an), "I am thinking there were multiple reasons for something like this—funding, but also Agenda2—re-wilding of the west—they want most all of the US to be 'NO HUMANS ALLOWED' . . . plus if people get sick/die from the heavy metals in the process, it's the sacrifice that must be made (from their perspective)."

If this conspiracy is true, EPA Administrator Gina McCarthy made an incredible sacrifice of her agency's credibility—and potentially her own career—to secure extra government money for her agency. This is akin to claiming that police are committing crimes in order to inflate the crime rate and justify bigger budgets. As evidence of this conspiracy, proponents point to a letter to the editor

The stew of toxic elements temporarily turned the river orange and caused concern for wildlife, farmers, tourism, and those who depend on the river for drinking water.

written by retired geologist Dave Taylor published about a week before the spill in a regional Colorado newspaper. The letter seems to predict that the EPA is up to something nefarious. Ironically, the letter actually contradicts key claims made by the conspiracy theorists who promote it. It does not predict an intentional spill of mine water into the Animas (or any other river) by the EPA but instead that well-meaning efforts at preventing seepage of mine waste might result in water being backed up and releasing on its own accidentally; as Taylor stated in an August 13 interview with Breitbart News, "That's one thing about the government. They never gave any thought to the possibility this thing could blow."

Furthermore, a careful reading of the letter (which can be found at http://www.silvertonstandard.com/news.php?id=847) clearly states that the EPA's hidden agenda is not—as the conspiracy theorists claim—gaining access to Superfund money through creating a natural disaster by poisoning a river but instead "construction of a treatment plant" for treating existing mine waste. In fact, Taylor explicitly states that "with a budget of $8.2 billion and 17,000 employees, the EPA needs new, big projects to justify their existence." In other words, according to the geologist, the EPA's struggle is not getting more money but using the money it already has. Cherry-picking evidence is of course classic conspiracy theorist behavior, and any tiny nugget of information that might conceivably be

twisted into evidence is gleefully shared.

It may seem odd that an obvious environmental accident would prompt conspiracies, but there are several reasons for this. In the world of conspiracies, as the saying goes, "there are no accidents." Princess Diana's death in a car "accident," for example, was in fact a cleverly disguised assassination by the British intelligence agencies (or those upset at her romance with an Arab man, etc.). Even hurricanes, wildfires, tsunamis, and other obviously natural disasters, including the 2010 Haiti earthquake, are suspected of being part of a dark conspiracy. And, of course, conspiracy theories abound on the subject of health, with many convinced that doctors and Big Pharma are colluding to keep cancer cures off the market and push disease-causing vaccines on the public for the sake of profits.

Another element is the paradoxical assumptions that conspiracy theorists make regarding government competence: On one hand they believe that no one would be stupid or careless enough to "accidentally" trigger a breach in a retaining lake of mine waste with heavy equipment, but on the other hand they claim that the government sloppily leaves clues about what they're up to—for those clever enough to find them (such as those who misread Taylor's letter to the editor).

Rumors, whether true or not, are popular in part because they serve a social purpose. Many people across the political spectrum endorse some version of conspiracy theory. In their book *American Conspiracy Theories*, Joseph Uscinski and Joseph Parent, both associate professors at the University of Miami, note that latent conspiracy thinking among the public only becomes "widely activated in a context where the belief helps a group balance against threats. Conspiracy theories are weapons of the weak to recover from losses, improve [social] cohesion, and coordinate resistance." In other words, the conspiracy theories surrounding the Animas River allowed people to vent their frustrations and distrust of the government—whether they really think the spill was intentional or not.

Woman Dies Searching for Monster

Benjamin Radford

A young woman was killed in April 2016 outside of Louisville, Kentucky, when she and her boyfriend were walking along elevated train tracks in search of a legendary monster reputed to dwell there. The couple—both from Ohio—were searching for a beast called the Pope Lick monster. Roquel Bain, twenty-six, and her boyfriend were on the tracks when a train arrived; the conductor saw them, sounded the horn, and applied the brakes, but it was too late. The man survived by dangling off the bridge, but the woman was hit and dragged, soon dying at the scene.

A news story in *The Courier Journal* reported that the pair had come to the area from Dayton for a ghost hunt of the Waverly Hills Sanatorium and decided to look for the Pope Lick monster in their spare time. The Pope Lick monster is said to be part human, part goat, and part sheep. It is one of many part-human monsters of regional lore across the country, including the Maryland Goat-Man and the Donkey Lady said to haunt a bridge outside of San Antonio, Texas.

Though ghost- and monster-hunting is depicted on television shows as harmless—if fruitless—fun, the dangers are real even if the subjects of the searches aren't. No one searching for Bigfoot, the chupacabra, or the Loch Ness monster has ever been injured or killed by one, just as generations of girls have bravely attempted to summon the legendary mirror-dwelling ghost/witch Bloody Mary without serious incident.

Deaths and serious injuries are not common, but they do happen. In 2006, for example, an Ohio girl was shot while exploring legends about a haunted house near a cemetery. She and a friend were trespassing, and she was critically wounded when the homeowner mistook the two for vandals.

In an incident eerily similar to the Pope Lick death, a man in neighboring North Carolina was hit by a train in 2010 while on the tracks at a rural bridge. The man was part of a ghost-hunting group who hoped to see the ghost of a train rumored to appear on the anniversary of an accident. Instead of a spectral train, a real one appeared from around a bend and killed one man when he couldn't get out of the way in time.

Unfortunately, Bain's death will inevitably become part of the Pope Lick monster legend, whether she believed in it or not and whether the creature is real or not. Legends of vanishing hitchhikers and hook-handed escaped serial killers can make for spooky fun around a campfire, but those who seek real-life thrills should be careful. No one should lose his or her life over a rumor or legend, and the death of Bain and others is neither spooky nor funny but tragic and preventable.

Apollo Astronauts Claimed to Hear 'Space Music'

Benjamin Radford

A show that aired in February claimed that the Apollo 10 mission encountered mysterious music or an alien signal while on the dark side of the moon.

According to a Discovery News story, "The astronauts who flew the dress rehearsal for the first lunar landing reported hearing mysterious 'outer space-type music' while flying behind the moon in May 1969. The case of the odd, unexplained whistling noise is uncovered during an upcoming episode of the Science Channel series, *NASA's Unexplained Files*."

The Apollo 10 astronauts can be heard on the tapes mentioning the odd sound, which lasted nearly an hour. Some reports even suggested that there was an attempt to keep the event a secret: "The Apollo 10 astronauts—Tom Stafford, John Young and Eugene Cernan—can be heard on recordings from the flight talking about the strange sound, and whether to tell NASA about it." This speculation—predictably—spurred conspiracy theorists who claim the recordings as the latest smoking gun evidence of a UFO coverup.

So what can we tell about the odd event? First, it's clear that the sound—whatever it was—originated in the capsule as part of the mission, not outside it. In the 1660s, British scientist Robert Boyle demonstrated that sound waves must be carried by a medium (such as air), and therefore cannot travel in a vacuum or near vacuum (such as space).

Another curiosity is that the sound was described as "outer-space type music," which is an artifact of a psychological phenomenon called "priming." This involves how our ideas about the world influence our interpretations of audio and visual phenomena, especially ambiguous stimuli. No one knows what music from outer space sounds like, since no extraterrestrial music has ever been heard or recorded. Without some basis for comparison, it's clear what the astronauts meant was that it reminded them of composed music that had appeared in popular culture used to evoke an outer-space setting, such as perhaps the theremin instrument in *The Day the Earth Stood Still* or *The Thing from Another World* or countless other radio plays or television shows such as *The Twilight Zone* and *The Outer Limits* and so on, which were broadcast decades before the Apollo 10 mission.

What the Science Channel show refers to as "an unsettling incident on the far side of the moon" was in fact described as merely a "whistling sound" at the time, and sensationalizing TV writers expanded it into something far more significant, including "strange otherworldly music." Despite it being casually referred to as "music," there's no mention of the sound having any characteristics of music: no melody, rhythm, or form, for example. In short, there's no evidence that it was anything other than as described: a constant whistling or "wooooo" sound. So what could it be?

James Oberg, a CSI fellow and veteran of Mission Control, told me in an email:

> [The mystery] is created by concealing fundamental features of the event, such as the highly significant fact that the "space music" weird noises occurred during formation flying by the Apollo Command Module and the Lunar Module landing vehicle, as the astronauts talked by radio from ship to ship. The noises were clearly some sort of interference between the two radios separated by tens of kilometers, and they were heard again on the following mission.

Oberg noted that the claim that NASA and the astronauts tried to hide or cover up the mystery is false. In fact, astronaut Michael Collins reported the same sound on Apollo 11, which he described in his 1974 book *Carrying the Fire: An Astronaut's Journey*. According to Oberg:

> The noises were discussed in real time by the astronauts over radio links that were broadcast live, and in more detail by the crew during debriefings back on Earth—as they should have been, as a fundamental safety principle of examining all anomalies for indications of threatening malfunctions.

The idea that the astronauts discussed whether or not to tell NASA about the sound is nonsensical, since all their transmissions and conversations were being recorded. The discussion was not whether to engage in a conspiracy to hide what they heard (as Oberg notes, some of it was being broadcast live, and in any event even if it weren't, NASA would find out sooner or later when the recordings were reviewed). Instead the discussion was whether the odd sound might indicate a severe enough communication problem that Mission Control should be notified.

Some doubted that the sound could have been ordinary radio interference. Pilot Al Worden—who was not on the Apollo 10 mission and didn't hear the sound firsthand—is quoted in the show as believing that "The Apollo 10 crew is very used to the kind of noise that they should be hearing," suggesting that had it been interference, the crew would have clearly recognized it as such. While it is true that the crew would be familiar with the sound of interference, that doesn't mean that all interference would necessarily sound exactly the same. The fact that the astronauts didn't recognize the sound and couldn't identify its origin is not surprising. As Oberg notes, "No astronauts had ever experienced interference with this particular hardware, especially behind the moon, ever before."

Different conditions create different sounds, and a low, monotone "wooooo" sound coming over a radio is far more likely to be interference than, say, alien music. While providing fodder for the mystery-mongering UFO crowd (not to mention Pink Floyd fans), the fact is that the Apollo 10 mystery sound is not quite so mysterious when all the facts are examined. ■

Superstition Masquerading as Science

Psychiatrist Makes Devilishly Weak Case for Demonic Possession

RACHEL AMMIRATI, SCOTT O. LILIENFELD, AND DEAN MCKAY

An essay by Dr. Richard Gallagher, a psychiatrist who purports to be "a man of science," was featured in the July 1, 2016, online Opinions section of the *Washington Post*. The essay elicited strong reactions from many quarters; for example, it has drawn over 2,800 online responses as of this writing. Although the title of Gallagher's essay is alarming enough—"As a psychiatrist, I diagnose mental illness. Also, I help spot demonic possession"—his grasp of science is even more troubling. In his essay, Gallagher claims to be able to identify individuals who are demonically possessed and to help exorcists distinguish them from people suffering from genuine mental illnesses. As clinical psychologists, two of whom are members of the Public Education and Media Committee of the Society for a Science of Clinical Psychology (SSCP), we are deeply concerned that his approach to explaining human behavior has the potential to damage the profession and contribute to harmful mental health practices.

At the outset, Gallagher tries to persuade readers that he is a skeptic. He describes himself as "inclined to skepticism" and notes that he once told an exorcist, "I wasn't likely to go in for a lot of hocus pocus." He argues that "respect for evidence," among other virtues, guides his approach to psychiatry, teaching, and evaluating claims concerning demonic possession. Further, he asserts, reasonably, that in most cases behaviors attributed to possession can be accounted for by "more prosaic problems" such as "a medical disorder; mental illnesses," suggestibility, or "fraud."

Gallagher's Observations

Nevertheless, Gallagher's apparent skepticism dissolves once he recounts the story of his first encounter with a woman whom he concluded was possessed by a demon. He describes her as a "self-styled high priestess" who "called herself a witch and dressed the part, with flowing dark clothes and black eye shadow around to her temples." It is unclear if the woman's prototypical appearance influenced his conclusion that she was "possessed" (see Tversky and Kahneman 1974 for a discussion of the representativeness heuristic), but almost certainly other elements of her behavior did. Shortly after touting his many Ivy League affiliations (which in science should carry less weight than the ability to think critically and a commitment to basing arguments on high-quality data), Gallagher builds suspense by telling readers that he has witnessed phenomena that he cannot explain using conventional knowledge. He then relates the following observations regarding this woman's behavior:

> She could tell some people their secret weaknesses, such as undue pride. She knew how individuals she'd never known had died, including my mother and her fatal case of ovarian cancer. Six people later vouched to me that, during her exorcisms, they heard her speaking multiple languages, including Latin, completely unfamiliar to her outside her trances.

Logical Problems

There are several serious inferential problems with Gallagher's arguments (see also Novella 2016 for a critique of Gallagher's claims). First, "undue pride" is hardly a rare or idiosyncratic weakness. Second, Gallagher neglects to consider the possibility that the woman's apparently preternatural awareness could merely be the result of cold reading. Cold reading consists of a set of techniques, such as making educated guesses based on population base rates or providing highly generalized descriptions that apply to almost everyone (the P.T. Barnum effect), which are routinely exploited by fortune-tellers, psychics, magicians, and others who wish to persuade people that they possess paranormal abilities (Hyman 1977; Rowland 2001). Third, some of what appears to be evidence of this woman's psychic abilities could also or alternatively reflect hot reading, that is, obtaining informa-

tion about a target using nonparanormal means, such as reading newspaper obituaries or searching the Internet. Fourth, the assumption that a person could speak multiple languages only while in a "trance" is dubious at best. Did Gallagher entertain the hypothesis that she simply hadn't advertised having learned these languages previously? And how do we know that her Latin was especially accurate? Fifth, it is unclear why, given what is widely known about the limits of eyewitness testimony (Arkowitz and Lilienfeld 2009), Gallagher would be so willing to believe the "vouched" reports of a group of eyewitnesses, especially those who are presumably motivated to believe in demonic possession.

The "self-styled high priestess" whom Gallagher discussed reported that she had connections to Satanism, going so far as to identify herself as Satan's "queen." Yet the accuracy of her report should be highly suspect given psychological research on memory. For example, laboratory research indicates that individuals who report experiencing past lives (Meyersberg et al. 2009) and alien abductions (Clancy et al. 2002) display higher rates of false recall and commit more recognition errors than do comparison participants.

Gallagher further offers levitation, extreme strength (which can be caused by excess cortisol and adrenaline surging through the bloodstream; Wise 2009), and "statements of astonishing venom and contempt for religion" (which do not require a paranormal explanation) as compelling evidence that demonic possession is real. Without a doubt, evidence of levitation without assistance would be extraordinary; however, we shouldn't assume it is due to demonic possession. Notably, Gallagher acknowledges that "I have not witnessed a levitation myself, but half a dozen people I work with vow that they've seen it in the course of their exorcisms." Thus, his most impressive ostensible evidence for the existence of demonic possession again relies on secondhand eyewitness testimony. In addition to the great potential for errors in memory, might those who report witnessing levitation be unduly motivated to see it? Might they be misinterpreting another behavior, such as erratic jumping, as levitation? Indeed, Gallagher neglects to note that skeptics have debunked similar apparent episodes of levitation ("yogic flying") among people practicing transcendental meditation, demonstrating that they reflect little more than unimpressive hops (Carroll 2011). Moreover, when asked why he and others have been unable to produce more compelling evidence of levitation, Gallagher offers an answer that smacks of a common sign of pseudoscience, namely, evasion of peer review: "One cannot force these creatures to undergo lab studies or submit to scientific manipulation; they will also hardly allow themselves to be easily recorded by video equipment, as skeptics sometimes demand."

Logical fallacies are also evident in many of Gallagher's key arguments.

Although Gallagher claims to engage in "careful observation of the evidence" related to demonic possession, his conclusions regarding the possibility of being a "sophisticated psychiatrist" who believes in demons reveal his biases:

> Most of my scientific colleagues and friends say no, because of their frequent contact with patients who are deluded about demons, their general skepticism of the supernatural, and their commitment to employ only standard, peer-reviewed treatments that do not potentially mislead (a definite risk) or harm vulnerable patients. But careful observation of the evidence presented to me in my career has led me to believe that certain extremely uncommon cases can be explained no other way.

To say that something "can be explained no other way" suggests that Gallagher, a "practicing Catholic" and author of a book about demonic possession, has fallen prey to confirmation bias, the ubiquitous tendency to attend only to evidence that supports one's beliefs and to neglect evidence that does not (Nickerson 1998). Yet confirmation bias is exactly what the tools of science help us to overcome. Furthermore, it is worrisome that Gallagher seems almost to scoff at the dedication of some mental health providers to using treatments that do not mislead vulnerable patients.

Logical fallacies are also evident in many of Gallagher's key arguments (see Novella 2016). After noting that many cultures believe in possession and the paranormal, he states, "despite varying interpretations, multiple depictions of the same phenomena in astonishingly consistent ways offer cumulative evidence of their credibility." Here, Gallagher commits the bandwagon fallacy—the erroneous assumption that widespread belief in a claim constitutes sufficient evidence for it. Or, as psychologists often say, reliability (consistency) should not be confused with validity. His assertions also seem to court the *argumentum ad antiquitatem* fallacy—the erroneous assumption that a belief must be true because it has existed across long stretches of time. More likely, the fact that belief in the paranormal has been "astonishingly consistent" across cultures says more about the nature of human cognition (i.e., that there is something about the brain that renders us susceptible to supernatural beliefs) than about the existence of demons. Later, Gallagher commits the logical fallacy of

false equivalence—assuming that two things are the same when in fact they are not—when comparing evidence for demonic possession to evidence for George Washington's crossing of the Delaware. He contends that "in both cases, written historical accounts with numerous sound witnesses testify to their accuracy." Perhaps had historians claimed that George Washington levitated across the Delaware, Gallagher's comparison might be defensible. Yet even if this hypothetical scenario were true, it would not change the fact that Gallagher is again relying on anecdotal testimony.

After initially advertising his "skeptical" approach to evaluating claims of possession, Gallagher commits the common error of confusing skepticism with cynicism.

After initially advertising his "skeptical" approach to evaluating claims of possession, Gallagher commits the common error of confusing skepticism with cynicism. He states, "while the American Psychiatric Association has no official opinion on these affairs, the field (like society at large) is full of unpersuadable skeptics and occasionally doctrinaire materialists who are often oddly vitriolic in their opposition to all things spiritual." Unwillingness to entertain a remarkable claim (cynicism) differs greatly from demanding evidence that is as remarkable as the claim (skepticism). A skeptical thinker could, in principle, be persuaded to consider the possibility of demonic possession if the data were overwhelming. Nothing that Gallagher offers as evidence for demonic possession, however, approaches the realm of the extraordinary.

Implications for Mental Health Practice

Finally, it should be noted that many practicing mental health professionals occasionally encounter nonpsychotic individuals who express concerns about the possibility of demonic possession, alien abduction, sightings of long-deceased individuals, and other implausible phenomena. Indeed, large swaths of the population believe in these and related paranormal claims (Rice 2003). At the end of his piece, Gallagher asserts:

> Those who dismiss these cases unwittingly prevent patients from receiving the help they desperately require, either by failing to recommend them for psychiatric treatment (which most clearly need) or by not informing their spiritual ministers that something beyond a mental or other illness seems to be the issue. For any person of science or faith, it should be impossible to turn one's back on a tormented soul.

To the contrary, rigorous skepticism is not equivalent to denying a suffering individual care. Furthermore, as a psychiatrist, Gallagher is not obliged to confirm or disconfirm his client's belief in demonic possession. Rather, his job is to improve his or her psychological adjustment. Some well-meaning mental health professionals, in an effort to enhance their clients' functioning, "join the resistance" by engaging in discussions regarding the veracity of their claims, however fantastical they may be (Lebow 2006). At some point, however, responsible psychotherapists should begin to explore ways in which the client may hold such beliefs while still functioning adaptively. In other cases, therapists may need to encourage their clients to consider alternative explanations for their bewildering thoughts and experiences. By endorsing a set of paranormal beliefs, embracing what is more akin to an antiscientific mind-set, and going beyond joining with the client, Gallagher sets the stage for other practitioners to do more harm than good. At a bare minimum, clients deserve mental health practitioners who understand the nature of science and appreciate the value of critical thinking skills, demonic possession be damned. ■

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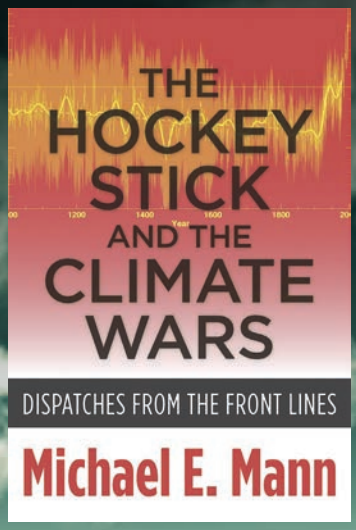
Michael Mann and the Climate Wars

MARK BOSLOUGH

Physicist and CSI Fellow Mark Boslough interviewed noted climatologist and geophysicist Michael Mann, who will be speaking at CSICon Las Vegas.



Michael Mann

Mark Boslough: To anyone who has followed the "climate wars," your name is a household word. Deniers even coined the phrase "Mann-made global warming" in an attempt to make it synonymous with their belief that global warming is an elaborate hoax. From my vantage point as a scientist and skeptic, you seem to be the person they love to hate more than anyone else except perhaps Al Gore. Why do you think they have singled you out from the scientific community as their poster child for sustained vilification?

Michael Mann: Well—there are certainly other leading climate scientists who have been frequent targets of climate change deniers. But I suppose there are a few things that are different in my case. For one, I am directly associated with one of the most prominent graphs in all of climate science, the "Hockey Stick" curve that my coauthors and I published back in the late 1990s. That curve became an icon in the climate change debate. It told a simple story—that the warming of the planet we're experiencing is unprecedented. That made it a threat to fossil fuel interests and, as I detail in my book *The Hockey Stick and the Climate Wars*, it made me a direct target of the industry-funded climate change denial machine. The Eye of Sauron was fixed on me. Rather than shrink from the battle, I chose to fight back—by defending my work in the public sphere and by devoting myself to public outreach and education. That no doubt further antagonized climate change deniers. Ultimately, they provided me a platform for informing the public discourse over what is arguably the greatest challenge we have faced as a civilization. I consider that a blessing, not a curse.

Boslough: As you say, you weren't the only author of the 1998 Mann, Bradley, and Hughes "Hockey Stick" paper that made such an impact. You were just an up-and-coming postdoc and your coauthors were already prominent. I was taking a paleoclimatology course at the time and had never heard of you, but we were using Bradley's textbook. A couple of years ago I attended a dinner for the Climate Science Legal Defense Fund, and two guests sitting at my table introduced themselves as "Et and Al." They were Bradley and Hughes, and the joke was a reference to their having been eclipsed by you. Do you think you were the main target of Sauron's initial wrath because you were first author or because deniers mistook you for easy pickings?

Mann: That's right. Interestingly, much of the focus was on me alone, rather than my two senior coauthors, Ray Bradley and Malcolm Hughes. I suspect the reason was twofold. I was the first author and was quoted in most of the media coverage, so I was the scientist most directly associated with the research. But additionally, I was viewed as far more vulnerable to attack, as I was only a postdoc at the time, a far cry from the job security of a tenured faculty position—which both of my coauthors had. The climate change denial machine wanted to bring me down, to destroy my professional career before it even got going, to make an example of me for other younger scientists who might too consider speaking out about climate change. In ***The Hockey Stick and the Climate Wars***, I refer to this as the "Serengeti Strategy."

Boslough: Seems like this strategy backfired spectacularly in your case. Have they successfully destroyed anyone else's career? Are they still pursuing the Serengeti method, or did they learn their lesson?

Mann: Well, yes—I like to think the hyenas tangled with the wrong zebra.

But unfortunately, this tactic continues to be deployed. Over the past year, the Republican chair of the House Science Committee, Lamar Smith of Texas, a recipient of considerable fossil fuel money, has initiated a campaign of persecution against leading climate scientists at NOAA and elsewhere, abusing his authority by serving them with vexatious subpoenas demanding their internal email correspondences and other such items, simply because he and the fossil fuel interests who fund his campaigns don't like the conclusions of their research. This has sent a collective chill throughout the entire climate science community, and it speaks to the fact that the Serengeti Strategy is very much still alive and well.

Boslough: You say they are still going after leading climate scientists. But as I pointed out in my NCSE review of your Hockey Stick book, even hyenas know to attack the smallest and weakest mem-

Republican chair of the House Science Committee, Lamar Smith.

Republican Senator James Inhofe of Oklahoma.

bers of a group. Is Smith really trying to destroy these scientists, or is he just trying to waste their time and discredit them in the eyes of his campaign donors and scientifically illiterate constituents?

MANN: Evil is as evil does. The motive, in the end, is personal destruction. It is to make cautionary examples of individual scientists for others who might think about playing a prominent role in the public discourse over climate change. Here's what will happen to you if you too put your head above the parapet! Now, whether it is the politicians like Lamar Smith, James Inhofe, or Ted Cruz themselves who are driven by this motive, or whether they are just being loyal foot-soldiers of the fossil fuel interests who have this motive is, in the end, in my view immaterial. We must judge them by their actions, and we must recognize them for the threat that they represent to society.

BOSLOUGH: Maybe there's a selection bias involved in my perceptions. Am I only aware of the fittest survivors whose reputations within the scientific community were actually enhanced? Are there examples of climate scientists who couldn't take it and quit? Or is it more subtle, with young scientists dissuaded from entering the field or keeping their heads down in a way that makes them invisible?

MANN: I suspect the real impact of the attacks is more difficult to detect. On the one hand, scientists coming into the field now appear to be more mobilized, more willing to confront misinformation and disinformation head on, more willing to engage in the public discourse, whether through social media or other means. But what I worry about are the young scientists we are losing to other fields, scientists confronted by a choice between those areas of science perceived as "safe" (e.g., dark matter, quarks, and black holes) and "unsafe" (e.g., climate change and other areas of environmental research) from attacks by vested interests and the politicians who do their bidding.

BOSLOUGH: I'm guessing you had no formal training in how to deal with political assaults on your science and had to learn it on the fly. Can those skills be taught to young scientists who are working in fields that make them vulnerable to attack?

MANN: Indeed, I did not. They don't train you for this in graduate school science programs. Perhaps we need to add a boot camp experience to our graduate training. Not only *can* we teach young scientists how to function in the increasingly hostile environment they may find themselves, we *must* teach them to do so. Fortunately, there is growing educational infrastructure for this within the scientific community. At meetings like the American Geophysical Union annual fall meeting—the largest member society in the earth sciences—there are now numerous workshops and sessions focused on science communication, the law, and other subjects that are critical to the defense of science from politically or ideologically motivated attacks. It's unfortunate that this is now part of the job description of doing science, but it's a good thing that scientists are recognizing this and rising to the occasion. The stakes are simply too great—we cannot lose the battle against the forces of unreason and inaction. The silver lining is that we are now creating a whole generation of scientist communicators who are not only doing great science but are effectively communicating the science and its implications to the general public.

BOSLOUGH: Did I hear that you have another book coming out?

MANN: *The Madhouse Effect* represents a collaboration between myself and the Pulitzer Prize–winning editorial cartoonist of the *Washington Post,* Tom Toles. We attempt to use humor and satire, as embodied in Tom's cartoons over the years (and a number of new cartoons exclusive to the book) to ridicule the absurdity of modern day climate change denialism. There is no better tool than satire to expose hypocrisy, and nowhere is there greater hypocrisy than the ongoing campaign by fossil fuel interests and their hired hands to deny the well-established science of human-caused climate change. Indeed, climate change denial would be humorous if the stakes weren't so great. The book takes the form of an annotated compendium of Tom's cartoons, which we use to explore everything from the fundamentals of science and how it works to the scientific evidence behind climate change, the predicted impacts, the campaign to deny climate change, the hypocrisy of denialism, the dangers of geoengineering, and, finally, the path forward. Ironically enough, we end on a cautiously optimistic, forward-looking note.

BOSLOUGH: Since this interview is for skeptics, I have to ask one more thing. Why do some members of the media still refer to individuals who reject the scientific method and mainstream climate science as "skeptics" even though they embrace the pseudoscience of denialism? How can we educate the general public about what skepticism really means?

MANN: Yes—this continues to irk many of us. We need to restore the term *skeptic* to its rightful place in the scientific discourse. In *The Madhouse Effect*, we mock—with a great new Tom Toles cartoon exclusive to the book—the laughable manner in which climate change deniers attempt to claim the mantle of Galileo, when they are the very opposite of Galileo, or Einstein, or any of the great paradigm breakers in scientific history. Galileo was a talented, well-trained, mainstream scientist, versed enough in prevailing scientific thinking to identify subtle holes therein. He wasn't a crank, so poorly versed in the science that he didn't understand the basics—that's what most climate change deniers are. Faux skepticism, i.e., denialism masquerading as skepticism, is another one of those aspects of the climate change debate that is so absurd that satire and ridicule is really the only way to address it properly. And that's what we do in *The Madhouse Effect.* ■

[INVESTIGATIVE FILES JOE NICKELL

Joe Nickell, PhD, is a skeptical demonologist. His many books include *The Science of Miracles* and *The Science of Ghosts*.

Dispelling Demons: Detective Work at *The Conjuring* House

The horror movie *The Conjuring* (2013) focused on the "demons" that allegedly plagued the Perron family—Roger, Carolyn, and their five daughters—at their Rhode Island farmhouse. The movie was a major box-office success.

In an article in the Skeptical Inquirer (Nickell 2014) and in the book *American Hauntings* (Bartholomew and Nickell 2015, 57–77), I analyzed the Perrons' claims of demonic activity and showed that they were consistent with the effects of strong winds, misperceptions, schoolgirl pranks, vivid dreams, simple suggestion, role-playing, and other factors—including one child's having had an imaginary playmate—and the effects of memory after some thirty to forty years. Then there was the influence of Ed and Lorraine Warren—"demonologist" and "clairvoyant," respectively—who made a dubious career of convincing such troubled people that they were plagued by demons while seeking book deals and encouraging their coauthors, some admit, to fabricate elements to make the books "scary" (Nickell 2014, 23).

Figure 1. Norma Sutcliffe stands at her historic home, now made notorious by the movie *The Conjuring* (2013), which bears little resemblance to the truth. The barn in the background never saw a hanging.

Norma Sutcliffe, who with her husband, Gerry, acquired the property in 1987 and has lived there until the present (Figure 1), reports no demonic activity. Yet the two have been plagued by a "*Conjuring*-instigated siege of their property," according to legal papers filed in their lawsuit against Warner Bros. Studios. Uninvited people suddenly appear on their property, while others make harassing phone calls at night. There have even been Internet discussions about destroying the eighteenth-century residence because "it's so full of evil"—among other outrages (Sutcliffe 2015–2016).

Norma invited me to visit her eighteenth-century property in mid-June 2016 to see for myself much of the rest of the evidence behind the fictionalized and fantasized story. Guided by her, I toured the historic Arnold-Richardson house and property, visited old cemeteries in the area, and searched archival records in the Harrisville town hall and library—all helping to further dispel the falsehoods and exaggerations that have been used to promote this utterly bogus case of demonic activity and demon possession.

There have even been Internet discussions about destroying the eighteenth-century residence because "it's so full of evil"—among other outrage.

Revealing Tour

Norma walked me through the historic house—from cellar to attic—where I saw the locations of many occurrences reported by the Perrons that were supposed to give evidence of demonic presences:

Dark Passages. With what the Perrons would come to think was an ominous warning, the previous owner told Roger, "For the sake of your family, leave the lights on at night" (Perron 2011, 45). But Norma found that a light would have been needed downstairs so family members could get to the bathroom in the middle of the night from their far-flung bedrooms on two floors—requiring treks through multiple rooms that were dangerously dark. The man obviously had given practical advice—not a warning of supernatural entities, which, in fact, he made no mention of.

Apparitions in Carolyn's Bedroom (now a study). Carolyn Perron once stirred from sleep to feel a "presence" and see a grotesque female figure looming above her while she was "immobilized" (Perron 2011, 185–187; Johnson 2009, 70–71). Clearly, she experienced a common waking dream that occurs between sleep and wakefulness, coupled with *sleep paralysis* since her body was still in the sleep mode. And this was not the only waking dream to occur among the Perrons (Nickell 2014; Bartholomew and Nickell 2015).

Opening Cellar Door. This had a habit of partially opening during the night, "Even after the family remembered locking it" (Johnson 2009, 48). Also when someone walked past the door, it might suddenly open behind the person's back (Perron 2011, 149). Norma explained that the door was a bit warped so that the antique latch did not fully engage. Thus, temperature fluctuations (such as the house's wood and metal cooling at night) could cause the latch to release and the door to pop open. (It was never actually "locked," only latched.) Or when someone walked by, depressing the floorboard, the latch could again release and the door open. Norma and Gerry had the door fixed after they moved in and discovered the problem (Sutcliffe 2015–2016).

Locking Attic-Room Door. On one occasion, two girls were playing with a Ouija board in an attic room when they were unaccountably locked in—ostensibly by evil entities (Perron 2013, 24–25). Actually, the door has the same type of latch as the cellar door, and if the door had been pulled unthinkingly or had been allowed to swing after the girls entered, the latch bar would bounce upward as the door closed and then drop down and engage, "locking" the girls inside the room. No demons were needed.

Dead People in Walls. Young Cindy Perron claimed she could feel the spirits in her bedroom, insisting there were

Figure 2. Norma Sutcliffe points out the cellar well where—according to unfounded accusations—Bathsheba Sherman supposedly drowned her children. In fact, she never lived in the house.

"seven dead soldiers buried in the wall" (Perron 2013, 279). However, the walls were only seven inches thick—we measured—so that could never have happened. (She also perceived "a whole bunch of people eating in our dining room" and several "little ghosts"—"native children"—playing in a nearby pine grove [Perron 2013, 69–70, 164–165].) Her claims were surely only the imaginings of a child who exhibited many of the traits associated with fantasy proneness (Nickell 2014, 23).

Fly Infestation! Andrea Perron wrote pages about "houseflies" in their home, appearing unaccountably "in the middle of deep winter." There were "clusters of them huddled together, as if plotting the next move." She concluded: "It was far more than infestation. It was manifestation." In time, "inexplicably, the phantom flies disappeared," she said, but years later Lorraine Warren "would arrive and explain that the flies were there with purpose and reason, as the harbingers of things to come." Andrea would call them "the devil's pets" (Perron 2011, 83–94, 265–266). In fact, clues to the real explanation are found in her own words ("winter," "clusters," etc.), which indicate that the infestation was probably caused by housefly-look-alikes called "cluster flies" that behave as described (see "Ask the Orkin Man" 2016). They are explained by science, not demonology.

Kitchen Phenomena. Several supposedly supernatural events occurred in the kitchen (now the dining room), "Considered one of the most active rooms in the house" (Perron 2011, 448). For example, Andrea once witnessed a pot of meatballs "go flying off the surface of the stove without the assistance" of her father. Actually, her mother disagreed, and in fact Roger Perron was at the time "seething with anger" and had not only "touched" the pot handle but even followed up by "kicking the pot past his daughter." It seems absurd therefore to postulate a "kitchen witch" (Perron 2013, 235–238).

On another occasion, Carolyn started peeling an orange when she saw blood trickling from it. She first thought she had nicked herself with the knife but could find no wound. To keep her youngest daughter from wandering in and becoming frightened, she hastily cleaned the blood from the sink and floor and threw the "bloody orange" in the trash (Johnson 2009, 545–555). The most likely explanation here, I think, is that she had mistakenly gotten hold of a California blood orange. Some of these can resemble ordinary oranges but yield a deep, blood-colored juice—hence, the fruit's name ("Blood Oranges" 2016).

Many more examples could be given, but these are sufficient to show how the Perrons repeatedly suggested supernatural explanations for mundane events—even before they found themselves under the spell of the Warrens.

Deaths Multiplied

Numerous people have allegedly died tragic deaths at the Arnold-Richardson house—an implication being that their unrequited spirits haunt the place or that they have somehow been transformed into malevolent entities or demonic presences. But what are the facts about the deaths of the people allegedly involved? Historical research reveals the eye-opening truth.

The central figure is a reputed witch named Bathsheba Sherman. Based on amateurish "research" of local records and lore and later confirmations by "psychics," Carolyn Perron focused on Bathsheba, allegedly accused but acquitted of murdering an infant as part of a ritual sacrifice, "a deal struck with the devil" (Perron 2011, 298–299, 321–325). It was even said that Bathsheba had hanged herself in the barn near the Perron home (Johnson 2009, 43–46, 51; Perron 2011, 404). The time came when the "demons" were consolidated, when "Mrs. Warren referred to the God-forsaken spirit as the lone demonic presence in their house, calling her by name: Bathsheba" (Perron 2011, 328).

Figure 3. Author researching a compendium of deaths, known as *The Black Book of Burrillville*. (Author's photos)

Numerous people have allegedly died tragic deaths at the Arnold-Richardson house. But what are the facts about the deaths of the people allegedly involved? Historical research reveals the eye-opening truth.

In fact, as we shall see later, no records are known to confirm any of the allegations against Bathsheba Sherman. She is buried next to her husband, Judson, in the Riverside Cemetery in Harrisville, where her tombstone records her date of death as May 25, 1885. The Burrillville town records[1] give the cause of death as "paralysis." Her obituary in *The Burrillville Gazette* (May 29, 1885) corroborates the cause as "a sudden attack of paralysis"—almost certainly a stroke. Her funeral service was conducted by Rev. A.H. Granger, a Baptist minister, one of various facts belying the claim that she was a witch.

But if Bathsheba Sherman did not hang herself in the Arnold-Richardson barn, maybe it was instead Susan Arnold, age ninety-three, as later claimed by Carolyn Perron (Perron 2011, xx, 102). Alas, despite the Arnold surname, her suicide was at her home elsewhere on Harrisville Road. According to a newspaper clipping ("Burrillville" 1866), Susan was the fifty-year-old wife of John Arnold. She locked herself in an attic storeroom where she was found hanging "from a wardrobe hook with a very small cord."[2]

Other Arnold deaths wrongly assigned to the famous house include those of Prudence Arnold in 1849 and Johnny Arnold (son of Edwin, who did once own the property) in 1911 (Johnson 2009, 50; Perron 2011, xxi). Prudence was not yet twelve when she was murdered—her throat slashed by a jilted suitor—at the home of her stepparents in Uxbridge, Massachusetts ("The Inquest" 1849; "Uxbridge Tragedy" 1849). And a despondent fifty-seven-year-old John A. "Johnny" Arnold committed suicide by taking "a dose of paris green" (commonly used as an insecticide and rodent poison) "at his home near Tarkiln" ("Obituary" 1911)—not at the Arnold-Richardson house as alleged by Perron (2014, 182).

Still other alleged deaths on the historic house property have no known basis in fact. These include the infant whom Bathsheba Sherman allegedly killed, the wound "presumably inflicted with a needle" through the base of the skull (Perron 2011, 384–385; Johnson 2009, 51), and one or more of Bathsheba's own children, whom she is "rumored" to have drowned in "the basement well" (Figure 2) (Johnson 2009, 51).

However, there is no available documented record of Bathsheba (or anyone else, for that matter) having killed an infant. Had any such documentation been known, it would likely have been recorded in what is known as *The Black Book of Burrillville*, a list of the unusual deaths in the township of Burrillville, from 1806, compiled by historians (Matthewson n.d.).

In light of what we have seen so far, consider the following quotation—in which every single statement but one is false:

> The Black Book of Burrillville, the town's former public records book, reveals that over the course of its existence the property has been host to two suicides by hanging, one suicide by poison, the rape and murder of eleven-year-old Prudence Arnold by a farmhand, two drownings,[3] and the passing of four men who froze to death, in addition to other tragic losses of life. ("*The Conjuring* Filming Location" 2016)

One man, Jarvis Smith, did die of exposure on the property on March 20,

1901 (Matthewson n.d.). Otherwise, none of the previously listed deaths occurred there; neither was Prudence Arnold raped, judging from the official report ("The Inquest" 1849). And the *Black Book*—which I personally examined from beginning to end (Figure 3)—is not "the town's former public records book."

The problem is not the *Black Book* of course but of numerous shoddy researchers compiling bogus claims, misinterpretations made by them and others, and attributing the false information to sources they have misread or never seen.

Clues at Hand

Volume three of Andrea Perron's wordy, repetitious, self-published trilogy, *House of Darkness House of Light* (2014), continues to relate anecdotes from the Perrons' residence in the 1970s. The accounts provide clues as to what really took place.

In the first volume (Perron 2011, 243–244), much was made of a "solid blue tubular beam of light" that shot down the chimney into a room, then retraced its route and disappeared. Carolyn "would speculate about the effects of the light for many years to come." Hearing about it, Lorraine Warren insisted that, writes Perron, it was supernatural, "manifesting as a beam of Cosmic Light traveling through space and time, then entering a specific portal; delivering a message received by mortal souls who have witnessed its affect [sic] yet remain unable to discern its meaning"—perhaps a "blessing" or a "curse" (Perron 2011, 244).

Reportedly, the phenomenon happened twice more (Perron 2011, 244). Current resident Norma Sutcliffe also once saw a blue light shoot across the bedroom, but she is quick to say that she does not attribute any such odd happening to the supernatural. And in volume three, Perron (2014, 332) now concludes that—while the light was the "most amazing thing" she ever saw in the old house—it was really "a tube of blue lightning." That is consistent with the rare phenomenon of ball lightning that has been reported to enter houses, sometimes through chimneys ("Ball Lightning" 2016).

Elsewhere in volume three we read of an interesting apparition of a woman that appeared only to Christine at night and always in a window as an accompaniment to her reflection. She found it disturbing. Andrea gives a secondhand account (Perron 2014, 13–14):

> . . . [S]he'd glance at a window, only to see the woman standing behind her own reflection in the glass. The spirit was always the same. So much taller than the youngster, she stood out in the crowd. . . . No optical illusions involved, no mistaking it for something else beyond the glass, this was an entity. As if standing at the mirror, there she was, right behind the kid, gazing at the glass with her . . . just watching Christine watching her.

Having researched something like this before, I think it was indeed an "optical illusion": a double reflection of the girl, despite Perron's haste to convince readers otherwise. Note that the second image was that of a female, taller, and always fixed in the same position relative to her. Everyone has seen his or her image reflected in a window, especially at night. Actually, both the front and back surfaces of the glass reflect an image, but these are usually so close together as to go unnoticed. Seeing a reflection from an angle could enhance the separation, but an even more intense effect can be produced by wavy old glass such as that at the Arnold-Richardson House. I had occasion to duplicate and photograph such an effect to explain Abraham Lincoln's having once famously seen his double image in a mirror (Nickell 2001, photo on p. 11).

Quite another entity was partial to April, the youngest of the Perron girls, who was only five when the family moved into the house. Supposedly, April often communicated telepathically with a little boy named Oliver whom she could find "always upstairs in the chimney closet." She believes he is still there (Perron 2013, 93–99). However, during their final week at the house in 1980, April spent a lot of time upstairs (Perron 2014, 183–184): "Day after day, for hours and hours she waited, speaking to him gently. . . . How could April bid him a fond farewell if he refused to come make his presence known? In spite of her prompting he was a no show on the stage of life and afterlife."

What had happened? Such entities are unknown to science—except as the familiar "imaginary companion" with whom certain young children interact as if the entity is real. The phenomenon seems to be rather more frequent among lonely or unsociable children or those who have difficulty in their family relationships (Goldenson 1970, I: 597–598). April now says she often "felt like an abandoned child" who had to spend much of her time alone. Also, "our mother appeared depressed most of the time and our father was just angry" (Perron 2014, 339). It seems that, as typically happens with imaginary companions who become outgrown as the child finds different ways of meeting his or her emotional needs (Goldenson 1970, I: 598), "Oliver" simply went away and could no more be reclaimed than April could herself turn back time and become that little girl again.

Conclusions

The evidence mounts that the Perrons were a dysfunctional family. They were not preyed upon by "demons" (whose existence is not supported by science), but rather they believed in such due to religious and paranormal propaganda, as evident throughout Perron's books. The merest noise or other odd happening was treated with the illogic of what is known as an argument from ignorance: "We don't know what caused it, so it must have been paranormal." A "demonologist" and a "clairvoyant," Ed and Lorraine Warren, were anxious to convince them that demons—and a book deal—were lurking in the shadows. In the final volume of her trilogy, Andrea Perron (2014, 216) tells how Lorraine Warren eventually proposed just such a deal to her mother Carolyn.

Carolyn's five daughters appear to have followed her lead: with the judg-

ments and imaginations of children, they were soon competing for much-needed attention, reporting every "demonic" occurrence. When their father Roger doubted much of the phenomena and denounced the Warrens as "a pair of two-bit charlatans" (Perron 2013, 263), Carolyn felt that he questioned her integrity and the girls stood "squarely in her camp" (Perron 2011, 112; 2013, 195). Eventually, he seemed—at least after suffering estrangement and divorce—to acquiesce in favor of family harmony.

It is no wonder that hysteria came to reign and "demons" were ever-present, or that things have since quieted with the thirty-year tenure of Norma Sutcliffe, who does not believe in demons. Still, the quiet has been disrupted by the Hollywoodization of the old farmstead and the misrepresentation of truth by shoddy research, misperceptions, exaggeration, probable mischief, suggestion, and more, including the power of the almighty dollar. We see that the major "demons" were Ignorance, Superstition, and Greed, and they still hold some in their power. ■

Notes

1. The death register (vol. 1A, 1854–1900) gives her name as Bathsheba Greene, apparently after a later marriage, but she is buried beside her first husband, Judson Sherman, with his surname.

2. The determined woman had in the room with her a gun, knife, and vial of mercury. Also she had laid out on a bed in another room "all the clothes for her burial."

3. Andrea Perron (2011, 472–475) refers to two Bakers, a father and son, who "reportedly drowned on this property." However, the *Black Book* (Matthewson n.d.) relates only a single Baker drowning, the suicide of Chester A. in 1949, "in Harrison Mill Pond."

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[PSYCHIC VIBRATIONS ROBERT SHEAFFER

Sheaffer's "Psychic Vibrations" column has appeared in the SKEPTICAL INQUIRER for forty years. His new book, *Bad UFOs,* is available through his blog, BadUFOs.com. His website is www.debunker.com.

MUFON Gets into the Bigfoot Business

The Mutual UFO Network (MUFON) is the largest and best-known organization of its kind in the United States (and probably in the world). Founded in Illinois in 1969 by Walt Andrus and others, it was originally known as the Midwest UFO Network. MUFON is now riding high with its show *Hangar 1* on the so-called History Channel, which even most serious UFO proponents reject due to its sensationalist approach and deceptive use of fabricated government documents (see this column, January/February 2016).

MUFON has now announced that it is getting into the Bigfoot business. MUFON's executive director, Jan C. Harzan, announced that its West Virginia state director and longtime Bigfoot investigator Fred Saluga has been named to the new position of "Cryptoid Studies Coordinator" (MUFON people love titles and positions; they have created lots of them). Harzan said, "We realized, over time, that a small percentage of our cases mention odd creatures that cannot be identified. . . . Adding Cryptoid Studies to our investigation strategy is part of MUFON's on-going goal to expand how we review and study UFO cases. Please welcome me in congratulating Fred for taking on this important study" (http://goo.gl/U3Rv2S).

But some people are not too happy about this. Lon Strickler, author of the Fortean Blog *Phantoms & Monsters*, points out that MUFON's mission statement states: "I. Investigate UFO sightings and collect the data in the MUFON Database for use by researchers worldwide; II. Promote research on UFOs to discover the true nature of the phenomenon, with an eye towards scientific breakthroughs, and improving life on our planet; and III. Educate the public on the UFO phenomenon and its potential impact on society."

You'll find nothing in there about Bigfoot, Nessie, or other crypto-beasts. Strickler, noting the sensationalism and fabrications in MUFON's *Hangar 1*, notes, "It doesn't add to the organization's credibility when we learn from a MUFON state director and one of the presenters on *Hangar 1* [John Ventre of Pennsylvania] that the missing Malaysia Airlines Flight 370 was abducted by extraterrestrials or makes a statement on a radio talk show that he believes malevolent extraterrestrials are actually demons."

Strickler, obviously bristling at his new competitors, concludes:

> By adding other aspects of investigating the paranormal, it seems to me, and others who have raised doubts, that MUFON seeks to increase membership and revenue by becoming the Mutual Unidentified Flying Object and Other Unexplained Phenomena Network. Every serious paranormal and cryptid enthusiast should take note. Do you want MUFON to stockpile any evidence, anecdotal or physical, that would otherwise be directed to dedicated Fortean researchers and investigators? I say HELL NO! Hey MUFON . . . stick to flying saucers and spacemen! (http://goo.gl/yG90qD)

And in other MUFON-related news, its former Utah state director, Erika Lukes, has resigned and formed her own organization named Unexplained Utah. It serves up a healthy dose of Bigfoot, along with UFOs and other "mysteries," with a little observational astronomy mixed in. They are already being filmed for a History Channel show about Dugway, Utah, allegedly the site of secret underground bunkers, convoys of mysterious black sedans, mysterious lights, etc. Paranormal claims abound in Utah, and I suspect Unexplained Utah will become a major player in the Fortean game.

* * *

Patty Greer (no relation to mega-UFO promoter Steven Greer) might be called the "Queen of Crop Circles" these days. She gave a talk at this year's Contact in the Desert UFO Conference, set in the middle of California's Mojave Desert during the hottest time of the year (with much of it outdoors at a time when nearby Palm Springs was reporting 115 degrees). Greer posted a photo to her Facebook page on June 12 showing her speaking on the outdoor stage, flanked by two security men. What gives? She wrote:

> It was my first time pulling a 'Steven Greer move' with security. Unfortunately, the people that are hiding my first 4 films from the world were there and they were quite creepy. *We had armed security, mind control security, and psychics throughout the crowd.* Many of them had cameras and were watching/filming them. We are all still wondering why gaia/gaiam and scientology were allowed to be there? This is a spiritual event! (Emphasis added.)

Her comments about a "Steven Greer move" refers to certain "security theater"

tricks at Contact in the Desert in 2013. Steven Greer showed up with armed security guards, who proceeded to stand in the exits while he gave his speech. Not to be outdone, David Wilcock brought not only his own guards but also what he claimed was a bomb-sniffing dog, and Wilcock's guards actually prevented people from leaving during his talk! (See this column, January/February 2014.) Given the degree of paranoia rampant in UFOlogy, many attendees take such charades seriously, not recognizing them as silly theatrical stunts intended to create the illusion that certain speakers are in constant danger because they "know too much about flying saucers" (or perhaps about crop circles).

But it seems that the evil Men in Black (or whoever) have failed to squelch Ms. Greer's latest film, *Crop Circle Diaries*, which she is now promoting:

> Journey to the UK epicenter of the Crop Circle phenomena with award-winning filmmaker Patty Greer. After visiting dozens of UK Crop Circles she had a "Contact" experience in a 2007 formation that altered the course of her life forever! She "Listened" (the secret of telepathic communications) and 8 movies were co-produced in record time with no training or previous experience. *Crop Circle Diaries* offers an accumulation of Greer's most astounding experiences in more than 100 UK Crop Circles. (http://goo.gl/6LFZUp)

Speaking of the Men in Black, George Noory, host of the late-night UFO and conspiracy radio show *Coast to Coast AM*, has suggested that two recently deceased paranormal researchers "may have been murdered" (http://goo.gl/kyLbII): "Concerns are magnified by the fact that [Max] Spiers passed away only a few days after prominent Indian paranormal researcher Gaurav Tiwari also died." But then in true sensationalized clickbait fashion, Noory then backtracks and explains:

> A reasoned examination of the situation suggests that the two researchers were probably not the victims of a vast conspiracy. . . . Murdering both men would have required a considerably complex conspiracy, since Tiwari died in his native India while Spiers passed away in Poland. So while paranormal researchers should be saddened by the unfortunate passing of the two men, it is unlikely that they were victims of an organized movement to purge the field.

Noory closes with the reminder that "Coast Insiders can check out the 3/12/2014 edition of C2C where disclosure activist Stephen Bassett discussed his concerns over a spate of prominent UFO researchers dying due to fast-acting cancers." (For more on Bassett and "Disclosure," see this column, September/October 2016.)

At this year's Contact in the Desert, much of the discussion involved Blue Avians. David Wilcock has been promoting the wild stories of alleged contactee Corey Goode, who claims that there not only is a secret space program but it is fighting a secret war with evil aliens (http://goo.gl/IznWtn). Giant blue spheres, some as large as Neptune (and others as small as Earth's moon) have been entering our solar system. They are inhabited by Blue Avian beings (more accurately, Blue Avian Aliens), and they are up to no good. As if we didn't have enough problems to worry about here on Earth.

* * *

Did sixty-two children actually see a landed UFO at the Ariel School near Harare, Zimbabwe, in 1994? According to many UFOlogists they did, and the case has since gone on to become something of a classic. The children were first interviewed by Cynthia Hind, a local UFO investigator and writer. The Harvard psychiatrist and UFO abductionist Dr. John Mack (1929–2004) visited Zimbabwe two months after the incident and spent two days at the school interviewing the children and the school staff.

Recently, the French UFO skeptic Gilles Fernandez, who has a PhD in cognitive psychology, reviewed those investigations and interrogations. He built upon the earlier investigations of the case by another French skeptic "Nab Lator," who first successfully de-blurred the placard and busted the "Roswell Slides" last year (see this column, September/October 2015).

Fernandez noted that "it is particularly interesting (and telling) to see how the protection and ecology of the planet 'appears' in the testimonies of the children when Mack questioned them, while this theme was not present in the narratives collected by Cynthia Hind." This strongly suggests that Mack was "leading" the children to create narratives matching Mack's own beliefs and concerns. Lator had observed in 2011 that "The boy is coaxed to imagine a rationale, then transpose it into the real world in the next question. A manipulation that is hidden by the editing of short sequences in the video. John Mack is caught red-handed encouraging the child to confabulate, integrate imagination into reality." (More details about this incident, and sources, are on my *Bad UFOs* blog at http://goo.gl/8ck3Wj.)

Fernandez notes that while much research has gone into developing procedures for interviewing children, neither Hind nor Mack use anything resembling proper procedures:

> The child must be interviewed individually (again following proper procedure). Now, in the video-recorded excerpts above, it is striking to see that children are interviewed in a "line" from four to six. Sometimes other children are in the background and listen to a child being questioned. The adults talk to each other or "debrief" while the children are still very close and present. . . . Cynthia Hind conducting the interview is constantly interrupting the children and not allowing the free narrative. . . . There was also a session where the children were invited [by Hind] to draw on the board this time around and not just on paper. . . . It is still in my opinion a methodological error: the child is placed as in a school exercise status, "forcing him to produce" for adult authority and waiting for something. . . . John Mack also, two months later, invited children to draw. . . .

The most cogent observation so far on the Ariel School case is the one made on my *Bad UFOs* blog by Richard Ernsberger: "This all reminds me of the McMartin preschool case only without people going to jail and having their lives needlessly destroyed." ■

Matthew Nisbet is associate professor of communication at Northeastern University and a Committee for Skeptical Inquiry scientific consultant. From 1997 to 1999, he was public relations director for CSI.

Winning the Vaccine War

Focus on Community-Based Strategies and Avoid Denigrating Parents

Since the 1960s, high rates of childhood vaccination in the United States have led to dramatic declines in cases of polio; measles, mumps, and rubella (MMR); chicken pox; and other diseases. The benefits to society have been overwhelming. Over the past two decades alone, vaccines have prevented an estimated 322 million disease cases, 730,000 early deaths, and $1.4 trillion in related costs (Whitney et al. 2014).

Government-led vaccination programs have been so effective that many Americans aged forty-five and younger have little to no comprehension of the lethal threats that these diseases once posed, contributing to their doubts about vaccine safety and their opposition to government mandates. In a 2015 national survey, 41 percent of eighteen- to twenty-nine-year-olds and 35 percent of thirty- to forty-nine-year-olds said that parents should be able to decide whether to vaccinate their children. In comparison, only 23 percent of fifty- to sixty-four-year-olds and 20 percent of those sixty-five and older said the same. These differences are likely partially explained by the comparatively greater proportion of younger Americans who believe that vaccines are unsafe (Pew Research Center 2015).

Yet despite these troubling trends, in 2015 the rate of vaccination for infants and kindergartners in the great majority of states and communities remained at or above 90 percent. At such rates that approach "herd immunity," it is difficult for infectious diseases such as measles to spread, enabling outbreaks to be contained. But according to 2015 estimates, some states and communities remain dangerous outliers. In Arizona, it is estimated that only 84 percent of infants are vaccinated for MMR. In Michigan, only 59 percent are covered for rotavirus. Moreover, across states, poor communities tend to have disproportionately low rates of infant vaccination (Elam-Evans et al. 2014). At the other end of the spectrum, in some wealthy communities in California, the rate of vaccination for kindergartners is only 50 percent (Yang et al. 2016).

Overall, these statistics paint a complicated portrait. Vaccination rates remain strong in the great majority of U.S. communities, suggesting that vaccine doubts among parents are not translating into a national-level problem. Yet in some communities, childhood vaccination rates are dangerously below herd immunity levels. To counter these trends, research suggests that a nationally focused education and media campaign could create awareness among parents of a false "controversy" that backfires by generating greater doubt and concerns (see Nyhan et al. 2014).

Instead, what are needed are carefully evaluated communication strategies tailored to the dynamics of doctor-parent interactions and to specific communities, regions, and school districts that have high rates of non-vac-

cination. Policy measures, such as changes in state laws and programs that make it more affordable or easier to access vaccination services, are also needed. In each approach, the complexity of parent attitudes and decisions needs to be carefully considered. Simplistic characterizations of parents as either antiscience "deniers" or pro-science "believers" are misleading and counterproductive.

Apart from the communication approach used by health care providers, other strategies are needed to increase vaccination rates among children from low-income households. These may include eliminating co-payments for vaccination-related doctor's visits.

Health Care Providers and Access to Services

Not surprisingly, the most relevant population to target from a communication standpoint is parents with young children. In this case, a 2010 nationally representative survey of parents provides several tentative insights. That year, more than 80 percent of parents with children under age six said that they had already vaccinated their children, and another 11 percent said they planned to vaccinate their kids with all recommended vaccines (Kennedy et al. 2011).

Despite a high rate of reported compliance, only 23 percent of parents said that they had no concerns about childhood vaccines. Many, even if deciding to vaccinate their children, harbor a variety of questions, concerns, and even doubts. Top concerns included that it might be painful for children to receive so many shots (38 percent of parents); that children were receiving too many shots in one doctor's visit (36 percent); that children are getting too many vaccines during the first two years of life (34 percent); that vaccines might cause fevers (32 percent); that vaccines may cause learning disabilities and autism (30 percent); and that the ingredients in vaccines are unsafe (26 percent) (Kennedy et al. 2011).

When asked which sources they are most likely to turn to for advice, 85 percent of parents mentioned health care providers, and 80 percent said that they trusted their advice. No other source came close. Surprisingly, despite fears about the spread of misinformation online, parents were far less likely to say that they turn to the Internet. The authors of the study conclude that "the Internet probably supplements, but does not replace, direct communication with a health care provider or other trusted individual" (Kennedy et al. 2011).

Given the central role that health care providers play, there is some debate over the best approaches they should adopt in communicating with parents. Some experts argue for a "presumptive" approach in which health care providers assume during routine visits that parents agree to the recommended schedule of vaccinations. In the presumptive approach, providers broach the topic by simply saying, "Well, we have to do some shots," and may follow by adding, "So, we'll do three shots and the drink. Is this okay?" Research suggests that this approach results in the highest rate of vaccination compliance among parents and their children (Opel et al. 2013).

Others argue for a "participatory" approach in which health care providers actively volunteer to address any concerns or questions that parents might have about vaccination. Research suggests that this approach results in a lower vaccination rate than the presumptive strategy, or may delay vaccination as parents put off the decision for a later visit. But advocates of the participatory approach argue that it reduces feelings of possible alienation or distrust among parents and avoids a possible backlash against overly presumptive health care providers (see Hendrix et al. 2016 for discussion).

Apart from the communication approach used by health care providers, other strategies are needed to increase vaccination rates among children from low-income households. These may include eliminating co-payments for vaccination-related doctor's visits, implementing home visits by health care providers, providing vaccination services at day care facilities and schools, and including vaccinations as part of other government benefits provided to low-income women and children (Community Preventive Services Task Force n.d.).

Engaging 'White Privilege' Communities

Several studies have identified the socio-demographic correlates of those outlier schools or districts with high rates of parents seeking vaccine exemption for religious or philosophical beliefs. For these parents, cost or access to health care is not the problem. Indeed, belief exemptions are most likely to occur in communities of so-called "white privilege," defined by their economic affluence and overwhelmingly white populations.

For example, in California, between 2007 and 2013, the percentage of religious and philosophical exemptions for children statewide is estimated to have increased from only 1 percent to 3 percent, but some suburban communities in the state are estimated to have exemption rates close to 50 percent. Within these mostly white communities, non-vaccination rates tend to be highest in smaller private and charter

schools. Studies have found similar correlates of nonexemption rates in several Midwest areas (Yang et al. 2016).

There is no silver-bullet approach to shifting the views of parents in these affluent communities. Each needs to be more carefully studied, identifying the specific parental concerns and beliefs unique to each context. Research should also examine how information about vaccination is shared among parents within the community, including the role of local health care providers, schools, churches, parent groups, elected officials, the news media, and social media.

Several legislative and policy strategies are perhaps even more likely to be effective. For example, in 2015 California joined other states in no longer allowing parents enrolling their children in schools and day cares to claim a religious or philosophical exemption. Following the adoption of the rule, the percentage of vaccinated kindergartners entering the state's schools was the highest in a decade (Pearlstein 2016).

More research, data, and time are needed to fully assess the impact of the California mandate and similar actions in other states. Such mandates are likely to be legally challenged and may reinforce distrust and alienation among parents. An alternative is to require that parents opting for a belief exemption pay an annual processing fee, set at a sliding scale based on income. The goal is to make a belief exemption by parents less convenient and more burdensome. The strategy is not only likely to increase vaccination rates but also generate revenue for vaccine education and outreach programs. More analysis of this strategy is merited (Billington and Omer 2016). ■

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[SKEPTICAL INQUIREE BENJAMIN RADFORD

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'M' Is for Mysterious Marks

Q: I was talking with a friend who lives in another state with her husband and fourteen-year-old daughter, M. She said M has had some strange paranormal things happening to her, and others have witnessed it. Strange blue marks appear on the walls throughout the house. It's not paint, marker, pen, or chalk, but magic eraser takes them off the walls. And no, it's not their daughter, as some of the places where the marks appear are up way too high. They had a clergyperson bless the house, who also suggested that this "presence" is following the daughter since it's happened in more than one house. I'm pretty much at a loss of what even to suggest to my friend. Do you have any suggestions?

A: I got the above question from an acquaintance whom I'll call "K." At the time, I was on my way to Los Angeles for a TV show and couldn't address it right then, but after examining a half dozen photos of the mysterious blue marks she sent (see Figure 1), I asked her to forward the following questions to her friend: "Is the daughter right-handed? Does anyone actually see the blue marks being made, or do they appear when no one is around? Are there any objects in the home that are the same color blue that could have been used to mark the walls?"

A few days later the answers were waiting for me upon my return, forwarded through our mutual friend: "Yes, M is right-handed. We have never seen the marks made, but they appear in other rooms when we are nearby and we have all been together in the same room. Some of the marks looked like they were sprayed. Other marks looked like finger streaks. Two of my brothers and husband have tried to figure out what has made the marks and they are at a loss to explain it. The marks first appeared on October 30 and 31." K also mentioned that M was adopted and her home life had not been stable; that and other issues had led to family tensions.

Figure 1.

I replied to K: "I don't know how you want to handle this. The marks on the wall were probably made by a right-handed person, most likely M but maybe someone else, I suppose. The fact that they first appeared at Halloween isn't surprising. It's not uncommon for 'ghost' events to occur in households with teenagers, and many are done for attention by teenagers. I don't have enough information to know 100 percent if that's what's going on here but it's very likely. I understand how a family would not want to think that a teen is faking it—and I'm not accusing anyone—I'm just telling you what the most likely explanation is based on my research and experience. The marks didn't simply appear on the wall by themselves: something—or someone—made them. Obviously I can't drop what I'm doing to fly out there and conduct a full investigation, but I do have a technique that will very likely prevent it from happening again: Buy one or more cameras to record what happens in the house. They cost between $60 and $150. Set up the cameras in places where the writ-

ing has appeared before; if it happens again, then whatever, or whoever, made it will be on tape.

After that, they have three options:

1) Make sure M knows that the cameras are being put in (in which case if it's her, the writing will happen in other places, but if it's not her then presumably the writing will paranormally appear);

2) Don't tell M that the cameras are there (in which case it's likely that she will be seen doing something suspicious); or

3) Tell M that one camera is being put in at one location, and put others in three or four different locations to see if something odd happens there (obviously they'd have to be different types/brands of hidden cameras).

If this is done and they get any sort of mysterious, unexplained footage of writing on the walls or anything else, I'll be happy to look at it."

K asked me if she could simply forward my response to M's mother instead of summarizing or paraphrasing my advice. I replied, "Sure, that's fine with me. I'm not trying to embarrass anyone or catch anyone, but the fact is that troubled teens have been known to fake paranormal activity for attention; it's a documented fact. Probably the most famous case was the 1984 Columbia Poltergeist case, where troubled teenager Tina Resch faked ghost phenomenon [I included a link to information on the case]. My concern is that the family has enough on their hands dealing with interpersonal issues without having to fear that their home is haunted. I understand that the writing is not the only thing they claim is going on there, and that's not uncommon; but if the ghost writing isn't real then it's unlikely the rest of it is either."

About a week later, I got the following forwarded reply from K: "I was expecting this response. Tell Ben thanks for the time and thought he put into it. Our first thought was that it was M, but it couldn't be her with the cups flying out of the cupboard, and some of the blue marks appeared when she was gone. We really can't afford to go out and buy cameras. . . .We will keep a very close eye on things and think more towards her causing it if and when it happens again."

Doing real investigation into seemingly mysterious phenomena takes time, preparation, effort, and sometimes a significant amount of money. Some investigations I've done have taken only a few minutes, while others take days or even weeks.

It was not clear why she was certain that the mysterious blue marks appeared while M was gone, though it seems possible that they might be *discovered* while she was out of the house, and the family assumed that they had appeared shortly before their discovery. After all, she acknowledges that no one saw the marks being made and therefore without before-and-after photos of all the walls there would be no way to be sure exactly when the marks appeared. It's entirely possible that M could have surreptitiously made a mark on a wall in an inconspicuous place that might not be noticed for hours, overnight, or perhaps days.

I replied to K that "Yes, that was the response I was expecting: 'It can't be the person it most likely is, and we're not interested in putting in the time and money to prove what's going on....' The fact is that if what they're saying is true—that the writing appears mysteriously when no one is around—then they could get very rich by recording that happening; they could sell it to TV stations and probably have a movie made about it. Seriously, they could make tens of thousands of dollars if they had clear, genuine video of marks or writing appearing on walls in their home. If that's really what's going on—and it's not a hoax or a prank by someone for attention—then a $100 hidden camera would be the best investment they could make. I hope it all works out."

I never heard back (nor did I expect to), but this case highlights a stark distinction between how scientists and skeptics approach anomalous phenomena and how ghost hunters do. If there was a specific location where the known principles of science did not seem to apply—say, a given building or public area where demonstrable paranormal activity was believed to occur—scientists would return to the spot daily for months, years, or decades (however long it takes) to study, examine, and document this amazing anomaly. Ghost hunters, however, even when they are seemingly confident that they have experienced or recorded something ghostly or paranormal at a haunted house, often leave the place satisfied with their ambiguous evidence and don't return unless it's for a specific event, such as Halloween or another ghost hunt.

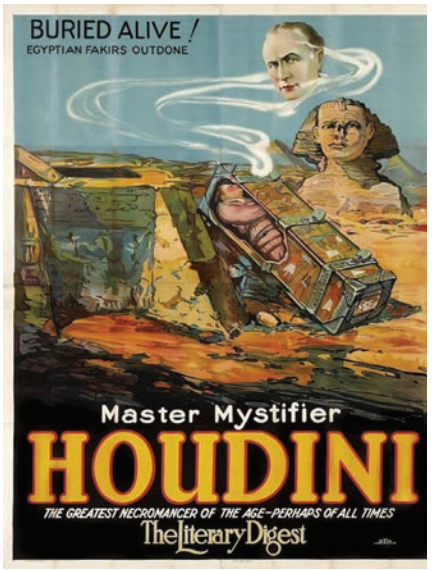
Doing real investigation into seemingly mysterious phenomena takes time, preparation, effort, and sometimes a significant amount of money. Some investigations I've done have taken only a few minutes, while others take days or even weeks. A few have taken months, and a handful—such as my chupacabra research—took several years. Often a mystery remains unsolved for the simple reason that people don't put in the time and effort required to find solutions. If you give up before you find the answer (or don't even bother to look), then of course the "unexplained" will remain so. ■

Massimo Polidoro is an investigator of the paranormal, lecturer, and cofounder and head of CICAP, the Italian skeptics group. His website is at www.massimopolidoro.com.

Houdini and the Cancer of Superstition

It is one of those discoveries long thought impossible: an unpublished manuscript, commissioned by Harry Houdini to H.P. Lovecraft, has finally resurfaced. It's actually a thirty-one page typescript titled *The Cancer of Superstition* and it went to auction in Chicago for Potter & Potter April 9, 2016, where it fetched $28,000.

But how did the King of Magicians and the writer who would get enormous (posthumous) fame as the master of weird fiction get together in the first place?



Prisoner of the Pharaohs

Houdini never had a formal education and, although a prolific reader, did not have the ability to write the books he wanted to author. For this reason, he used some very skilled ghostwriters, such as Walter B. Gibson (who later created the character of The Shadow), Albert Guissart, Clinton Burgess, and Bernard M.L. Ernst.

But when he chanced upon the talents of H.P. Lovecraft—then an unknown writer of modest means in Providence, Rhode Island—Houdini was so struck that he commissioned a book. At that time, Lovecraft wrote for *Weird Tales*, a popular magazine devoted to horror and science-fiction stories. Houdini had a profit-sharing plan in the magazine, and within its pages had already published two short stories (likewise written by others): "The Hoax of the Spirit Lover" and "The Spirit Fakers of Hermannstadt."

In 1924, for his third story, which would be titled "Under the Pyramids" (later changed to "Imprisoned with the Pharaohs"), Houdini told Jacob C. Henneberger, editor of the magazine, that the events in it actually happened, and he wanted someone to work it out as a real story. The editor then turned to Lovecraft as a possible coauthor.

In short, Houdini claimed that during a trip to Australia he had stopped in Cairo, Egypt, where he was kidnapped by two Bedouins and locked inside a pharaoh's crypt under the desert. From here, he had managed to escape only after going through a most "hideous experience" that he could not disclose (Silverman 1996).

In a letter to a friend, Lovecraft explained that his job would be to "invent" the episode and color it with the most macabre undertones. He was quite astonished by Houdini's intention to pass the story, "worthy of a Munchausen," as an actual adventure. "He's supremely egotistical, as one can see at a glance," Lovecraft wrote. But, eventually, he accepted the job for the sum of $100 (around $1,400 in present-day dollars). "I think I can come up with something pretty hellish. . . " (Selected Letters 1976).

Left to right: Harry Houdini, H.P. Lovecraft, and Clifford Martin Eddy, Jr.

The Most Nameless Slithering Horror

After devoting a lot of time and effort to writing an exciting and, as far as

it was possible, realistic adventure, Lovecraft lost the only copy of the manuscript on the train that was taking him to New York, where he was going to get married.

So, just after the wedding he was under the gun to rewrite the story, assisted by his wife, who typed it (certainly an unusual way to spend a honeymoon!).

"Boy, that Houdini job!" he wrote to his friend. "It strained me to the limit."

He had solved the problem by treating the kidnapping in Cairo realistically, and then for the part under the pyramids, he unleashed "the most nameless, slithering, unmentionable HORROR that ever stalked cloven-hooved through the tenebrous and necrophagous abysses of elder night" (Selected Letters 1976).

To make sure that the story could be adapted to the character of the popular showman, he then watered it all down with the formula: "It was all a dream." "It must have been a dream," said the protagonist of the story, Houdini of course, at the end, "or the dawn would never have found me breathing on the sands of Gizeh before the sardonic dawn-flushed face of the Great Sphinx."

Lovecraft's story is actually considered among the best written up to this time, and the fantastic and gruesome end is among his most effective surprise endings. Houdini was so impressed that he thought of Lovecraft as a regular contributor for his future projects, including a book tracing the anthropology and psychology of superstition that would be called *The Cancer of Superstition*.

The Cancer of Superstition

"My neo-Bush is our slippery friend Houdini, who was here early in the month," wrote Lovecraft, "and rushed me to hell preparing an anti-astrological article to be finished before his departure—a matter of five days; for which I received the not wholly despicable remuneration of seventy-five actual dollars. He says he has a devilish lot more for me to do, and has been trying to get me to meet him in Detroit at his own expense to talk things over—but I have maintained that I can do business best within sight of my native town's Georgian steeples" (Selected Letters 1976).

But Houdini suffered a blow in October 1926, in Detroit, and was rushed to the hospital.

"Just now," Lovecraft added, "I note in the paper that Houdini has had a breakdown—which must have occurred just after the last letter he sent me—so I fancy there will be a lull in negotiations. I'll send him a line of sympathy to jolly him along. Poor Eddy, who with my aid has been doing some revision for the nimble wizard, is quite worried about his unexpected intervention of the gods."

The Eddy referenced was Clifford Martin Eddy Jr., a Lovecraft collaborator. It appears, in fact, that when Houdini wanted to start working on the Superstition book, he hired both Eddy and Lovecraft. Houdini gave them a sketchy outline of what he wanted—a work on the origin, growth, and fallacy of superstition—and furnished Eddy with voluminous notes and ideas that he wanted incorporated in the book. He also suggested that perhaps Lovecraft could put the notes into shape so that Eddy could work from an outline Lovecraft prepared.

However, the unexpected took place: Houdini died on October 31, 1926. The project, which had just begun, had to be stopped. Bess, Houdini's widow, was approached and asked if she wanted Houdini's book to be finished, but she said no. An attempt was made to transform the work already completed into an article, but no publisher was found. The text was forgotten.

Until a few months ago, it was believed that only a few pages from this work were written, but the manuscript that went to auction, with its thirty-one leaves, showed that this was not the case.

A 'Classic' Houdini Book

In the manuscript pages, Eddy, Lovecraft, and Houdini try to build a theory where superstition is defined as an "inborn inclination" traceable to "primitive races . . . utterly ignorant of the laws of Nature," that now "persists only through mental indolence of those who reject modern science."

However, in the text they also struggle to balance this primitivist theory of the development of superstition against evidence of what was really a cross-cultural "scourge" surviving among their contemporaries, even the well educated, introducing citations of early twentieth-century studies on superstitious beliefs among students and faculty at prestigious American universities.

The typescript is divided into three sections, "The Genesis of Superstition," "The Expansion of Superstition," and "The Fallacy of Superstition," situating superstition among an array of pre-modern belief systems, including animism, fetishism, werewolves beliefs, witchcraft, and black magic.

Even though the text was written by C.M. Eddy and typed by his wife, it still originated from some ideas by Houdini and was edited and annotated by Lovecraft. It would probably have made a thin book if those few dozen pages (two are lost, but the surviving include two pages of bibliography at the end) was all that was written. But, had it been published, today we would probably look at it as a "classic" Houdini work, ghostwritten by none other than H.P. Lovecraft.

It may be interesting, in closing, to note that even if Lovecraft considered Houdini "incredibly self-centered" and with a "general lack of culture," he also credited him with being "incredibly honest in his research" and noted that, concerning the capacity of men for self-deception, he had "a tremendous amount of penetrative skill and workable erudition" (Silverman 1996). ■

Note

For more information on *The Cancer of Superstition* manuscript, see these two excellent blogs on Houdini: www.wildabouthoudini.com and harryhoudinicircumstantialevidence.com; for more on the Lovecraft connections, see wormwoodiana.blogspot.it.

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ODYSSEYS IN SCIENTIFIC SKEPTICISM:
40th Anniversary Celebration

This is the FORTIETH ANNIVERSARY YEAR of the COMMITTEE FOR SKEPTICAL INQUIRY and the SKEPTICAL INQUIRER.

In this issue we continue the fortieth anniversary celebration of the *Skeptical Inquirer* and Committee for Skeptical Inquiry with eight invited essays by notable skeptics on their personal "Odysseys in Scientific Skepticism." We follow that with a fifteen-year update of the CSI(COP) history timeline.

Bigfoot and I: Reflections on Forty Years of Skepticism

EUGENIE SCOTT

I needed a work-study job, and the new physical anthropologist reportedly was coming to the University of Wisconsin–Milwaukee with a large skeletal collection of monkeys, which with luck would need a handy work-study student to clean and organize.

It was the fall of 1965, and I was a junior in college, majoring in physical anthropology. I got the job; there weren't many work-study students willing to wash, sort, and label slightly smelly and somewhat greasy monkey bones fifteen hours a week. Prof. Neil Tappen not only hired me and, over time, taught me a whole lot of science, he gave me my first lesson in skeptical thinking.

Did I mention I was a physical anthropologist? Did I mention that every physical anthropologist secretly wishes that Yeti and Bigfoot were real? Of course we do!

Back in the 1960s, Bigfoot and Yeti cropped up in the tabloids even more often than they do today, along with astrology and alien visitations. One afternoon while we were waiting for class, a fellow student brought up Yetis, which quickly turned into a could-they-be-real conversation. "Well, maybe they're out there but really good at hiding themselves," and so on. Prof. Tappen happened by and, as he was the primate expert, we asked him his opinion. Were there undiscovered giant primates living in the wild? Would anyone find them?

"Highly improbable," was his answer. The claimed evidence was some dodgy footprints and some pieces of leather in the Himalayas that were claimed to be Yeti scalp but which could be just about anything. This was well before DNA analysis put to rest the claims of hair and skin as being from unknown primates. Tappen was small but tough and wiry. He had stalked those now-skeletal monkeys through the jungles and shot them out of the trees. He was a good field biologist who could handle himself outdoors. I pressed him, "But if you had the chance, wouldn't you go on an expedition to find a Yeti?"

He just looked at me with what I hoped was patience, but it might have been exasperation. "I'll be first in line for the *second* expedition," he commented and then went on his way.

Right. If Yeti or Bigfoot truly *were* real, someone would have found some really good evidence by now. Once some actual evidence existed, Neil indeed would have been first in line to pack up his field gear and head off into the wild to study this strange new primate—but given the combined improbability of its existence and the lack of good evidence, he wasn't going to waste his time. Just because the idea of giant primates in relict environments is really cool and you truly want it to be real, it can't be wished into being.

You have to think with your head, not with your heart.

I received my PhD and taught biological anthropology for several years before becoming a nonprofit director at the National Center for Science Education, which opposed the teaching of the pseudoscience of creation "science." These activities connected me to CSICOP, and I was made a fellow in 1988. Then and now, the question of how to identify a claim as potentially valid is at the core of scientific skepticism.

Then, as now, I recommend a classic article by the physicist James Trefil ("A Consumer's Guide to Pseudoscience," *Saturday Review*, 1978, pp. 16–21) that helped me think about the relationship between science and pseudoscience. Sometimes offbeat ideas turn out to be correct, so you can't just toss aside anything that isn't mainstream. And any scientist will tell you even more quickly than a purveyor of woo that we don't yet know everything about how nature or people work: there's a lot left for science to discover. So how do you distinguish the useful ideas, the potentially good ones, and the worthless?

Trefil suggests thinking of the content of science as being composed of three concentric circles (see Figure 1). In the center are the *core* ideas of science—the tried and true, repeatedly tested, and secure explanations that we rely on. Heliocentrism is here to stay. So is evolution, thermodynamics, CO_2 as a warming gas, and lots more.

Next is the *frontier*, where explanations are being proposed and actively tested. These are the hypotheses that university and industry scientists are working on now. Any science journal's table of contents can provide dozens of unsolved problems. Most of the solutions, alas, will not pan out: mostly you get pebbles, and some of the shiny stuff turns out to be mica, not gold. If the explanation is a good one, though, it will work its way into the scientific consensus and into the core. Otherwise, well, there's the outermost concentric circle, the *fringe*, full of ideas with serious problems.

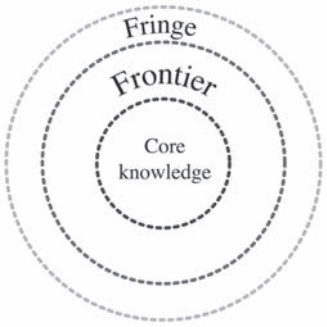

Figure 1.

Fringe science is incompatible with one or more core ideas of science. Flood geology, the creationist idea that Earth's sedimentary deposits are the result of the waters of Noah's flood, violates a very long list of core principles of geology. "Free energy" machines (you can invest in them on the Internet!) violate the principles of thermodynamics—like all perpetual motion machines, physicists don't invest in them. ESP? No mechanisms proposed, but worse, no unqualified demonstrations of the phenomenon.

One marker of a fringe idea is that professional scientists aren't spending time on it; they know it is very unlikely that ideas contradicted by core scientific explanations are going to be useful. The fringe is the land of amateurs, and not necessarily in a good way. Occasionally (rarely?), a fringe idea will make its way into the frontier. Even less often, it will be demonstrated to be a keeper. Continental drift was a decidedly fringe-y idea when first proposed, but gradually evidence built up, and it moved to the frontier. For decades scientists tested and built on the idea, and plate tectonics is now a core idea of geology. Mostly, however, fringe ideas deserve to stay there. But science is open to new ideas—it's not a closed shop. Still, to make the grade, the explanations have to be valid: your crazy idea has to actually help explain nature.

One marker of a fringe idea is that professional scientists aren't spending time on it.

And my friend Bigfoot? Well, some manifestations of the story are wildly improbable: that Yetis and Bigfoots are relict Gigantopithecus is going to stay on the fringe forever as violating too many core understandings of mammalian population biology. How many individual Yetis would be required to maintain a breeding population for the last ten or twenty million years—without a single fossil, bone, carcass, or reliable sighting? What are the caloric requirements of a large primate, much less a breeding population—and where is that food going to come from in a place such as Bigfoot's northwest coast forests? Unlike bears, another large mammal, Bigfoot, as a primate, is physiologically incapable of hibernation. What's it going to eat during the winter? Yeti has the same problem—only squared.

The quickest, back-of-the-envelope way to start analyzing a possible pseudoscience is to see, first, if professional scientists are spending time on it. If none are, that's a significant sign in itself. But maybe the idea is too new and, yes, scientists tend to be conservative, so professional scientific disregard isn't a deal-breaker in itself. But what *is* a deal-breaker is if the idea is incompatible with a well-accepted, core idea of science. Of course scientific explanations can change—but remember, the definition of a *core* idea is that it is so well tested that it's not worth continuing to test it. A core idea is used to build new hypotheses and explanations. We doubtless still have things to learn about the solar system, but that the Sun is at its center is not going to change with new data or theory.

If someone comes up with an explanation or concept that flies in the face of really solid science, don't waste your time. Wait for the second expedition. ■

Eugenie Scott, a physical anthropologist, is founding executive director of the National Center for Science Education. She is a fellow and member of the Executive Council of the Committee for Skeptical Inquiry.

My Personal Odyssey in Skepticism

HARRIET HALL

I discovered the Skeptical Inquirer shortly after its name change from *The Zetetic*. It changed my life. I had already rejected religion after reading atheist writings, but I was still open to belief in UFOs, ESP, and all sorts of other weird things, simply because I had never come across anyone who questioned those beliefs. It was a revelation to learn that there were other explanations for those phenomena. And it was a revelation to learn about the human psychology of how our thinking can lead us astray. Regular reading of Skeptical Inquirer educated me: it was equivalent to taking a college course in critical thinking.

Most people hate to admit it when they are wrong; I don't. One of the things I most love about skepticism is the opportunity to find out I was wrong about something. It means I have learned something and have a better grasp on reality than I did before. I feel smarter, and I find that very satisfying.

I wanted to know more. I read skeptical authors voraciously. I attended CSICOP conferences as a sort of groupie, wanting to see and hear in person the luminaries whose books I had read, the intellectual giants who had become my idols. Never in my wildest dreams did I imagine that I would be on the same stage with them some day. It never occurred to me that I might have anything to contribute. Then, in 2002, I attended CSICOP's Skeptic's Toolbox workshop, and Wallace Sampson and Ray Hyman encouraged me to try my hand at writing. I had never written anything before. When my first article was published in Skeptical Inquirer in 2003, I was ecstatic. I kept writing, and it developed into a whole new career. By my count I have now had thirty articles and reviews published in SI.

I continue to be overwhelmed and astonished at the unexpected course my life has taken. I have spoken at skeptical conferences in five countries. I am an editor of the *Science-Based Medicine* blog. I have written for Quackwatch, *Skeptic* magazine (where I have a regular column as The Skep-Doc), online publications, medical journals, and even briefly for *O, The Oprah Magazine*! I have coauthored a textbook on consumer health and appeared in several anthologies. And none of this ever would have happened if I hadn't subscribed to Skeptical Inquirer way back when.

My main area of focus has been medicine, alternative medicine, and quackery, because that's where I have something to contribute from my background as a physician and because I think medicine is the most important issue for skepticism today. Belief in Bigfoot and UFOs doesn't directly hurt anyone, but false beliefs about health regularly kill people. Anti-vaccine activism threatens everyone's public health. Desperate, vulnerable cancer patients are victimized by charlatans who persuade them to give up treatments proven to cure or prolong survival, get them to empty their bank accounts and mortgage their homes to pay for treatments that don't work, and get the dying to squander their last days in Mexico getting coffee enemas instead of at home spending quality time with their loved ones.

Beliefs in bogus treatments are as strongly held as religious beliefs. One of the lessons I have learned is that evidence and reasoning have no impact on true believers. I don't write for them. I write for the inquirers and the fence-sitters. Just as I had never questioned ESP until I read authors who questioned it, patients are not likely to question

alternative medicine and quackery if all they have access to is what the proponents have written. My aim is to put correct information out there where seekers can find it to counteract some of the misinformation they are bombarded with. The culmination of my efforts is a free ten-part video lecture series on YouTube (http://web.randi.org/educational-modules.html) produced by the James Randi Educational Foundation. In it, I distilled everything I've learned about science-based medicine and alternative medicine into the essential information that I want everyone to know.

The proudest moment of my life was when I became a CSI fellow. It validated my work and meant I had been accepted into the company of the people I had so long admired. My appointment to the Executive Council was icing on the cake. It's still hard for me to believe that I have become one of those people.

As a woman in the male-dominated fields of medicine, aviation, and the military, I frequently encountered sexist attitudes and unfair treatment. I wrote about my struggles in my book *Women Aren't Supposed to Fly: The Memoirs of a Female Flight Surgeon*. I never had any such struggles in the skeptical community. I was warmly welcomed and appreciated, and no one even thought to mention my gender. I was always treated as an equal, as a skeptic, not as a "woman skeptic." I felt that I had found my true home and family. I've been very distressed by recent reports of sexism in the skeptical community because it is so at odds with my personal experience.

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As long as humans are humans, promoting critical thinking will be a never-ending Sisyphean task. But I prefer to see the glass as half-full: I am encouraged by what the skeptical movement has accomplished over these past forty years. Skeptical information is widely available; skeptical organizations have sprung up all over the world; conferences have multiplied and are well attended; the media know who to call for the skeptical response to a story; religious belief is declining. On the occasion of this fortieth anniversary, I want to congratulate CSICOP/CFI and Skeptical Inquirer for all they have done to make the world a better place. And I can't thank them enough for making my own life more rational, more meaningful, and more productive. I am bursting with pride to have made some small contribution to their efforts. ■

Harriet Hall, MD, is a former Air Force flight surgeon, licensed pilot, and family physician. She critiques bad science and pseudoscientific thinking in alternative medicine and promotes critical thinking. She is a fellow and member of the Executive Council of CSI.

From Tiny Acorns . . .

CHRISTOPHER C. FRENCH

I was delighted to be invited to contribute to this fortieth anniversary issue of Skeptical Inquirer. The magazine first came to my attention when I read James Alcock's wonderful book, *Parapsychology: Science or Magic?* (Oxford/Pergamon Press, 1981) back in the early 1980s. I confess that, prior to reading Alcock's book, I believed in quite a number of paranormal claims.

Indeed, I can even remember presenting an entirely pro-paranormal session on parapsychology to a class of adults at a local community college as part of an introductory psychology course. In my defense, back then skeptical critiques of parapsychology were even rarer than they are now, and all the books I used in preparing the lecture were uncritically pro-paranormal—but I still cringe inside to recall that session.

Apart from opening my eyes to the fact that there were skeptical books out there (if you knew where to look for them), Alcock's book also contained numerous references to a publication called the Skeptical Inquirer, which I had never heard of up until that point. I cannot remember how I came to learn that Mike Hutchinson was the U.K. distributor for the magazine, but somehow I did and I took out a subscription. I used to eagerly await delivery of the magazine and immediately read every issue I received from cover to cover. It felt as if a whole new world was opening up for me. I also purchased and read many classic skeptical books by the likes of Martin Gardner, James Randi, and Philip Klass. I bought and read in its entirety the mammoth volume *A Skeptic's Handbook of Parapsychology* (Paul Kurtz, Prometheus Books, 1985).

In 1985, I got a job as a lecturer at Goldsmiths College, University of London. Up until this time, my interest in skepticism was very much a hobby, something that I pursued in my own time purely for my own enjoyment. But I decided that I knew enough about the area to give a two-hour lecture on parapsychology as part of a "Theoretical Issues" module that I taught in. This time, my presentation was much more skeptical. My interest in all things skeptical, but particularly the psychology of paranormal belief and ostensibly paranormal experiences, continued to grow, and after a few more years I was even publishing the odd paper in this area. (I am sure you all read my first empirical report in the *Australian Journal of Psychology*.)

In 1995, I decided I knew enough to present an entire module on "Psychology, Parapsychology, and Pseudoscience" as an optional final year module as part of Goldsmiths' BSc program in psychology. It proved to be a popular option with the students, and I loved teaching it. The range of topics I could cover was very wide, from entertaining subjects such as the techniques used by psychic con artists to the most profound questions facing humanity such as the possibility of life after death. The module also provided a fantastic training in critical thinking, helping the students to understand why some forms of evidence, such as properly controlled scientific studies, are so much more credible than others, such as anecdotes and personal experience.

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Over the next few years, more and more of my research was in the area of anomalistic psychology, but I certainly felt that my interest in the "weird stuff" was only tolerated as long as I also published in what were perceived to be more "academically respectable" areas of psychology. I obliged for a while, but I was becoming increasingly aware that it was anomalistic psychology that really fascinated me. In 2000, I set up the Anomalistic Psychology Research Unit at Goldsmiths (APRU; http://www.gold.ac.uk/apru/) to provide a focus for research activity in this area. I made a conscious decision to focus all of my research efforts in the area of anomalistic psychology.

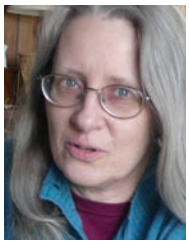
One of the APRU's aims was to raise the profile and academic respectability of anomalistic psychology, and I like to think we have had some success in achieving this. We generally publish our research findings in high-quality peer-reviewed journals and edited academic volumes. However, we are also keenly aware of the value of public engagement for universities, and therefore we take every opportunity to provide an informed skeptical perspective on a wide range of paranormal topics via the media and public events. Last year, for example, Goldsmiths hosted the European Skeptics Congress. The APRU also organizes an Invited Speaker Series and the Greenwich branch of Skeptics in the Pub, both of which are open to members of the general public and regularly draw in large attendances. For a decade, the APRU edited *The Skeptic*, the U.K.'s longest-running magazine devoted to providing a skeptical perspective on the paranormal.

The skeptic scene is currently thriving in the United Kingdom at all levels. Within academia, anomalistic psychology is increasingly taught at universities as an optional course, and the number of academic publications in this area increases year to year. At the grassroots level, there are around fifty branches of Skeptics in the Pub up and down the country and numerous conferences such as those organized by Centre for Inquiry–UK and the wonderful annual QED conference co-organized by Merseyside Skeptics and Greater Manchester Skeptics. The APRU has certainly played a role in achieving this healthy state of affairs—and it is fair to say that the APRU would probably never have existed if I had not read James Alcock's book all those years ago and been inspired to take out a subscription to Skeptical Inquirer. ■

Christopher C. French is Head of the Anomalistic Psychology Research Unit, Department of Psychology, Goldsmiths College, University of London. He is a CSI fellow.

Spreading Skepticism

WENDY GROSSMAN



Recently, the science writer John Horgan took skeptics to task in *Scientific American* (http://blogs.scientificamerican.com/cross-check/dear-skeptics-bash-homeopathy-and-bigfoot-less-mammograms-and-war-more/) and at the Northeast Conference on Science and Skepticism for focusing too much on weak problems at the expense of strong ones. As examples of soft targets he listed ESP, heaven, homeopathy, Bigfoot, and disbelief in vaccines and climate change; among hard ones, multiverses, the Singularity, overtreatment and overtesting for cancer (notably, mammograms), overmedication for mental illness, and the deep-roots theory of war. He contended that tribalism is served by our self-indulgence with "weak" targets.

Horgan was quickly advised how varied skepticism really is. Outside the United States, widespread belief in homeopathy matters much more if governments decide to include it in publicly funded, cash-strapped national health services at the expense of more effective treatments. Here, Bigfoot can only wish for such importance. But, as the late journalist Simon Hoggart said, even seemingly insignificant beliefs create "a distracting background interference with the truth."

As for mammograms . . .

The first time I heard a scientist question the value of screening mammograms was in Dublin in 1988, when Dr. Petr Skrabanek outlined to me the arguments he made in his 1985 letter to *The Lancet*. Skrabanek, whom I met a year and a half after founding Britain's *The Skeptic* magazine, was my first "skeptic about skepticism." In 2013, a Cochrane survey noted that the most reliable studies indicate that screening does not overall reduce breast cancer mortality but does cause much unnecessary treatment (http://www.cochrane.org/CD001877/BREASTCA_screening-for-breast-cancer-with-mammography). It's not a good target for skeptics in general, however, because most of us are not medical experts capable of mounting trials.

This goes to the heart of what, for me, skepticism is about: things we can test. Probably everyone knows at least one woman who knows that a mammogram saved her life with early detection. We can't test this any more than we can test whether the heavy weight pressing on someone's chest in the middle of the night was sleep paralysis, an alien visitor, or a ghost. We can only consider probabilities.

Some people are born to skepticism, some achieve it, and some have it thrust upon them. I think I was born this way. ("Everything I say, there's always an argument," my mother used to say.) As a Cornell student from 1971–1975, I watched friends experiment with transcendental meditation (TM) and Erhard Seminars Training (est). I became a professional folksinger and spent the rest of the 1970s encountering adherents of "old knowledge"—witchcraft, palmistry, and other beliefs that would shortly be reframed as "New Age." Particularly memorably, someone once told me he investigated a reincarnation claim and found the true explanation was genetic memory. Inwardly, I was like, "That's absurd," but I didn't want to have to sleep in my car. In January 1981, I called a friend and said, "Let's do something new and different for my birthday." "I can't," he said. "I have to go write up this lecture/demonstration." I said, "So I'll come to that."

"That" was James Randi, showing psychic surgery and metal bending, critiquing TM, and so on, and I thought he was . . . amazing. Here was someone who could provide a reasoned basis to all those "Seriously?" moments. That Martin Gardner and Isaac Asimov, whose work I knew from middle school, were Randi's

cofounders made CSICOP an organization worth following.

In late 1986, the then executive director of CSICOP, Mark Plummer, was pushing people to start local groups and suggested I start what became *The Skeptic*. The first responses were both exhilarating and sad. Exhilarating because people really wanted the magazine—people such as later editors Toby Howard and Chris French. Sad because so many wrote of their personal isolation.

I think Horgan's complaints would have been more accurate then, when we all seemed to cycle through a relatively narrow range of common beliefs. In 1998, when I began my second stint as editor (I had handed it off to Toby Howard and Steve Donnelly in 1989), Michael Shermer's work suggested it was essential to broaden our canvas to include scientific controversies such as climate change, science fraud, and education. How many times can you debunk astrology and stay interested?

Internationally, skepticism looks very different than in the United States, where the religious right has built huge controversies about evolution and reproductive rights, which are practically politically dead elsewhere. We "foreigners" can maintain our distance from matters of faith in ways that the U.S. "mother ship" cannot.

In 1991, I turned to specializing in what was then a barely born subject of interest: computers, freedom, and privacy or, as I often say, "the border wars between cyberspace and real life." As the Internet increasingly became a political football, I began to notice the distinct trend toward policy-based evidence making, particularly in the areas of copyright, cryptography, and surveillance, where dissenting evidence is no more welcome than it is to an astrologer ("I know astrology is true," an acquaintance said recently. "It's mathematics.") The FBI's recent effort to compel Apple to hack one of its own phones was a great example of technological magical thinking. Dozens of mathematicians cited the laws of mathematics; many politicians refuse to believe there's no "middle ground." Over the past five to ten years, what were separate interests have converged, and in London it's common to see my technical friends speaking at Skeptics in the Pub meets and skeptical friends becoming computers, freedom, and privacy activists.

In my technology writer capacity, the Singularity is an untestable claim. Perhaps artificial intelligence will outstrip human intelligence, continue to improve exponentially, and solve all our intractable problems. Many start-ups (such as the U.K.'s DeepMind, acquired by Google in 2014) hope that's true. To date, experience has shown that we can't solve social problems by throwing technology at them. The only available test is to wait and see.

Internationally, skepticism looks very different than in the United States, where the religious right has built huge controversies about evolution and reproductive rights, which are practically politically dead elsewhere.

However, the goal of the skeptical movement was never—or not for me—to debunk specific beliefs. Instead, it should be to spread critical thinking on whatever subject is shoved in front of us. For me, the most exciting thing is to look around Britain and see all the skeptical activity—*The Skeptic* magazine under the editorship of Deborah Hyde, more than 100 Skeptics in the Pub groups, the QED conference, ASKE—and to know the magazine helped make that happen. My greatest wish is that it will survive me. ■

Wendy Grossman is the founder and twice editor of the U.K. magazine *The Skeptic*. A technology writer living in London, she is a fellow of the Committee for Skeptical Inquiry.

A Glimpse Backward—and Forward—at Skepticism's Big Tent

BENJAMIN RADFORD

The Committee for Skeptical Inquiry and Skeptical Inquirer are celebrating forty years of organized modern skepticism—though of course skepticism itself has a long and honorable tradition, as practiced by Harry Houdini, Benjamin Franklin, Reginald Scot, David Hume, and others.

As it happens I have been closely involved with CSICOP/CSI for half of its existence, and therefore much of my adult life (had I been told at ten what I'd be doing at forty, I'd have considered that an extraordinary claim indeed). In some ways, the decades seem to have passed in the blink of an eye, and in other ways, it has taken an eternity.

I wasn't there in the early years: the heady seventies when astrology was rampant and Uri Geller was cranking out the woo trying to stay one step ahead of James "The Amazing" Randi. My entry to skepticism came in the mid-1990s when I began writing for Skeptical Inquirer after seeing a back issue (with a cover article by Randi) debunking a certain famously ambiguous and wily French author. A few years later at conferences, I got to meet both Randi and Carl Sagan, and with the encouragement of those two pillars of skepticism and others—as well as a fortunately timed editorial vacancy at Skeptical Inquirer—I joined the organization.

One of CSI's strengths is its broad array of expert contributors from seemingly disparate disciplines. When I give talks on skepticism, I often emphasize that people from any background can contribute meaningfully to our mission. I remember speaking to one woman who was interested in my investigations but felt she had no expertise, as she was neither a scientist nor an investigator. "What do you do?" I asked, and she replied that she was an optometrist—a job she assumed had no connection to skepticism. I mentioned several claims related to eyes and vision, including optical illusions and something called the "Bates Method," which rather improbably claimed to not only improve eyesight through eye exercises but also chronic illness and tuberculosis. She left my talk with a scribbled page full of notes on skeptical subjects within her purview.

I have yet to have a person name an occupation or hobby that doesn't have some angle into pseudoscience or paranormal claims. An auto mechanic can write about wild claims of improved fuel efficiency of "breakthrough" gas additives or devices; a dentist can examine alarmist claims about the dangers of fluoridated water or amalgam fillings; and so on. Anyone with a willingness to learn and share is welcomed. The fundamentals of skepticism are not difficult to learn, but they are often counterintuitive and require study.

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Skepticism is inherently multidisciplinary, and that is one of the things I find most intriguing about it. Magicians and psychologists help explain how we can be fooled—and how we fool ourselves. Folklorists help us understand how myths and legends influence our lives and inform our worldviews. Scientists help design, conduct, and publish research that tells us what's true about the world. Skepticism is a big tent, and there's room for everyone when people focus on the work rather than sowing discord over real or imagined ideological differences unrelated to skepticism.

My main interest has always been in investigative skepticism—specifically, applying scientific methods to "unexplained" or seemingly mysterious phenomena. I've spent more than fifteen years researching all manner of putatively unexplained phenomena, including ghosts, chupacabras, miracles, crop circles, UFOs, and much more. It's a subspecialty in a rarefied field; there're only a handful of people in the world who do these science-based investigations and conduct experiments testing paranormal claimants. There are other equally important roles in skepticism, but this is the one I've adopted—along with my writing, editorial work, and public outreach.

Any contributions I've made to skepticism and science literacy are owed in no small part to my being able to draw upon the wisdom and expertise of exceptional colleagues. Through my work at CFI, I've met a constellation of amazing people and personal heroes, including Randi, Sagan, Elizabeth Loftus, Jan Brunvand, Phil Klass, Carol Tavris, Martin Gardner, and others too numerous to name.

Sagan's indispensible book *The Demon-Haunted World: Science as a Candle in the Dark* opens with the quote, "It is better to light one candle than to curse the darkness." To me this reflects not only the goal of science and skepticism but humanism itself: Instead of merely complaining about problems we face, we should work to solve them; we should investigate to understand the world and use that information to make the world a better place. Sometimes that involves explaining to the public why alternative medicines don't work (even when they appear to); sometimes that involves comforting a terrified family by explaining that their home's strange nocturnal sounds are not evil spirits. Skepticism benefits the world in innumerable ways.

Today, astrology is a bit of a relic, and Uri Geller has finally (if tacitly) admitted he's a magician. But as longtime skeptics know, our work is never done. Discredited ideas and fanciful fallacies never go away but instead reappear as old wine in new bottles, repackaged in fashionable terms for a gullible new generation. Pseudoscience, superstition, and nonsense will always be with us in some form, wasting human resources (money, time, effort) and preying on the vulnerable. As long as there is darkness, skeptics will be there to fight for the light amid a chorus of curses. ■

Benjamin Radford is a research fellow with CSI, deputy editor of Skeptical Inquirer, and author, coauthor, or contributor to over twenty books.

How I Got Hooked on the Skeptical World

SUSAN GERBIC

Growing up in Salinas, California, during the 1970s, if you wanted to know anything, the outlets for finding it out were minimal. We relied on the newspaper, radio, and a couple of TV channels for our information. If you wanted more detail, there was always the *Encyclopedia Britannica* and the public library. Finding anything critical of the paranormal back then was difficult.

If it was mentioned, it was inevitably sensationalized—either advocating for the phenomenon or leaving you with "no one really knows. . . ." I was extremely gullible and naive, had no one to ask, and the Cold War was in full swing. It was a time of badly wanting to believe in the paranormal, life after death, and that a caring deity would not allow WWIII to happen. That is just what life was like then.

When I discovered Skeptical Inquirer magazine in 1996, it was eye-opening. I believe the first issue I picked up was the January/February "Star Cradle" one. My subscription began with the September/October 1997 issue. Inside I found answers to lots of questions—about ghosts, psychics, Bigfoot, all that fascinated me. I learned about things I had never thought of, and upon reading some articles I thought, "People believe *that*?" Other articles made me say, "Wait, that isn't *real*?" In early 2002, I received a flyer from CSICOP (now CSI); only an hour drive away there would be a gathering of skeptics. I walked in and decided to change my life. I acted as the hostess, inviting people to sit at a large table I had chosen and introducing people to each other even though I knew no one. They must have been quite amused. I had never been surrounded by such smart people before. I should have been completely intimidated, but they were so nice. My confidence (completely faked) and their reaction to it allowed me to find my people, and I had never before felt so accepted.

After that weekend, I was invited by Carol and Ben Baumgartner to attend Ray Hyman's Skeptic's Toolbox (a CSICOP workshop held in Eugene, Oregon), and after that weekend in August 2002, I was completely hooked on this world.

Fast-forward a few years, and everything completely changed; the Internet became popular and nearly everyone had email. The James Randi Educational Foundation (JREF) forum allowed me to meet other local skeptics, which

Guerrilla Skepticism on Wikipedia

The mission of the Guerrilla Skepticism editing team is to improve skeptical content on Wikipedia. We do this by improving pages of our skeptic spokespeople, providing noteworthy citations, and removing the unsourced claims from paranormal and pseudoscientific pages. Why? Because evidence is cool. We train – We mentor – Join us.

allowed me to cofound Monterey County Skeptics in 2007. Then Facebook expanded the community even further. JREF cruises were without Internet, which forced us to sit and talk for long hours. I met more amazing people, again building even stronger communities. Finally, I attended a lecture where Tim Farley was speaking about Wikipedia and why skeptics should care about it. Months passed and I finally started making small edits, completely self-taught. I started mentioning on Facebook what I was doing, and people asked me questions. When people asked if I might talk to their group and then more people were interested, eventually I had to take it seriously; that was the birth of Guerrilla Skepticism on Wikipedia (GSoW).

The project is, and always has been, about more than repairing Wikipedia in order to educate millions of people I will never meet. GSoW has been about the people in our community. I wanted to support those who were doing the science, writing the articles and books, lecturing, and podcasting. Not only so that when they are in the public eye readers will have something to see, but because I want people to know our history, to be inspired by our spokespeople as I am.

My personal focus in the community mostly has been to support people and projects—to find, train, and motivate people to do more to make our community stronger and grow. I'm a major advocate for conferences, as I know from personal experience that great things happen when people meet face to face. Share a glass of something and learn together. Outside of GSoW, I try to remain relevant, to be a thorn in the side of my favorite purveyors of pseudoscience, grief vampires. I have organized several projects (again calling on our community—look up Operation Bumble Bee, Operation Ice Cream Cone, and Operation Tater Tot for more information).

I want to thank CSI for giving me an opportunity to speak to you; I would never ever have imagined that my name would be printed in the pages of Skeptical Inquirer as it has been several times. Sometimes I think I'm still faking the confidence and you are just too nice to call me on it. Congratulations on forty years of amazing work, Skeptical Inquirer; I hope we can tango together for many more. ■

GSoW has been about the people in our community. I wanted to support those who were doing the science, writing the articles and books, lecturing, and podcasting.

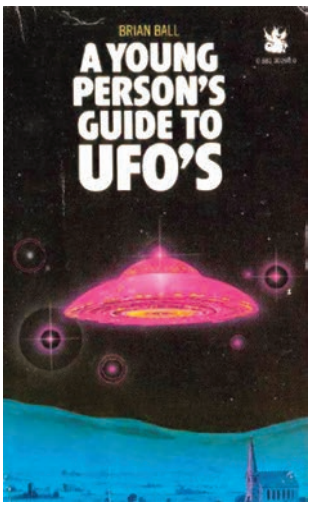
Susan Gerbic is founder of the Guerrilla Skepticism on Wikipedia (GSoW) project and cofounder of the Monterey County Skeptics. She is a CSI Scientific and Technical Consultant.

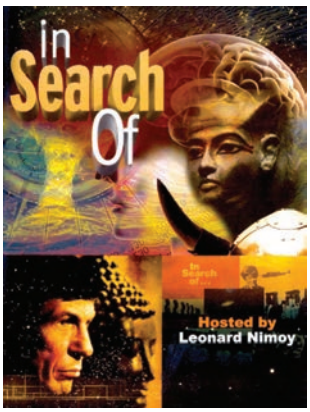
The Day the World Changed . . . for Me

RICHARD SAUNDERS

When I was twelve years old, UFOs were real. More than that, they really were from other planets and piloted by real aliens. There was a real monster living in Loch Ness and real tracks were left behind in the snow by the real Bigfoot. Some people had ESP, and others could really bend spoons with psychic power. What an incredible world it was for me in 1977.

By the time I was thirteen or thereabouts, inspired by TV series such as Leonard Nimoy's *In Search Of* . . . and books on UFOs, I created a questionnaire sheet (using a template from a long forgotten magazine or book) for my friends to fill out if they had really seen a UFO. My memory tells me I ended up with ten or so reports. The questions were something like "What time of day was it? Were you alone at the time? Can you draw what you saw in the space provided?" It was so interesting. No, it was much more than just interesting—it was deeply fascinating.





Interests come and go during the teenage years, but somehow the paranormal remained when other fads faded from my mind. Mostly it was UFOs, with my parents happy to indulge this passion—at least I was reading! For someone with mild dyslexia (why is that word so hard to spell?), reading anything was a positive move for me. One of the titles I remember was *A Young Person's Guide to UFOs* by Brian Bell. As I write this, I am flipping over to Google search and looking at the cover. How the memories flow back!

At one stage for a school art project, I screen-printed a drawing of a UFO, classic saucer shape, onto a T-shirt with the words "Watch the Skies."

I was happy with my limited capacity to research these matters: I had my books (a few more could be found in the school library), the odd TV show, the odd news report of a sighting, and of course stories and legends.

Then everything changed.

It was 1980 or maybe 1981, and I was home on a Sunday afternoon to watch a popular TV show of the time, *Great Mysteries of the World*, which more or less combed the world looking for other TV documentaries on anything strange and under sixty minutes (including commercial breaks). On this particular Sunday, the documentary aired was *James Randi in Australia* produced by Dick Smith. Apart from remembering him from an episode of *Happy Days* and seeing live the time he was thrown off an Australian TV talk show (search the Internet for Don Lane and James Randi to find it), this was the first time I'd seen Randi in action as it were. So, I sat there and over

the next hour watched Randi and Smith put a number of water dowsers to a test in a field "on the outskirts of Sydney" (the field has long since gone, replaced with modernity). It was all very interesting and entertaining, and in the end the results showed clearly that all the dowsers had failed.

Then came the moment, and for me it was life-changing, when Randi turned to the assembled dowsers and said, "Of the dowsers who are here today . . . I'd like to see a show of hands. How many still believe in dowsing?" All the hands shot up. What? What just happened? What? I just saw them all fail, without question all fail . . . but . . . they all still believe in dowsing? This moment really struck a chord with me. It was and still is one of the best examples of how humans believe things and keep believing no matter what.

Of course, the way I believed in things did not suddenly change (apart from seeing that water dowsing was a delusion), but at least for a start I could see how the dowsers fooled themselves and how they could be wrong, all of them. And if they could be so wrong, then why not other people who also deeply believed things?

It's one of those coincidences, the ones that many New Agers insist are "fate," that around the same time Carl Sagan's *Cosmos* TV series was broadcast in Australia. It was the one-two punch of reason. The episode featuring the Betty and Barney Hill UFO story was particularly powerful.

Mysteries and claims of the paranormal held such a fascination for me, but now there was a new aspect, a new perspective for me to consider. People might well be wrong or right, but testing them to find out for sure is even more interesting and engaging than I could ever imagine. It was for me the gateway to science.

So it wasn't photos of Mars (although they were very cool), new discoveries about biology, or the promise of solar power that tipped me, led me to having an understanding of the method of science. It was James Randi and his testing of a paranormal claim and Carl Sagan's soothing tones. I wonder how many other people can report the same?

Now I look back over the past sixteen years of my heavy involvement with the international skeptical movement. Twice president and a life member of Australian Skeptics and a fellow of CSI, I have tested many, many dowsers and others for not only the Australian Skeptics prize but also for the JREF $1,000,000 prize, played a part in the downfall of Power-Balance, produce a skeptical podcast, and (now in its thirteenth year) perform a skeptical science show for school students. That's what you get from watching Randi and Sagan when you're fifteen!

People might well be wrong or right, but testing them to find out for sure is even more interesting and engaging than I could ever imagine. It was for me the gateway to science.

I highly recommend you take forty-four minutes and watch *James Randi in Australia* on YouTube. One day I'll tell you the story of how in 2001 I found the only known copy, recorded by famed Australian Skeptic Barry Williams off the TV onto VCR in 1981. ■

Richard Saunders, a CSI fellow, is the host and producer of *The Skeptic Zone* podcast from Australia, life member of Australian Skeptics, and performer with the Mystery Investigators science school for schools. He loves to travel to skeptical events around the world not only to speak but to learn as well.

Skeptical Activism from the Bottom Up

MICHAEL MARSHALL

For someone who may well be the only full-time skeptical investigator in the United Kingdom, my exact route into skepticism is somewhat hard to recall. Lacking any previously unshakable belief in something entirely unsubstantiative, there was no Damascene moment of dramatic volte-face for me. Instead, my discovery of the skeptical movement came piecemeal, in what is doubtlessly a story familiar to many people: watching a TV show led to finding a podcast, which opened up a world of skeptical media, which prompted me to search for local skeptics and, soon, to set up a skeptics society.

When I cofounded the Merseyside Skeptics Society in early 2009, Skeptics in the Pub groups had only recently begun to spread beyond the well-established London event, with groups in Oxford and Leicester before our own in Liverpool. If numbers tell a story of success, the growth in the Skeptics in the Pub movement is encouraging: seven years on, there are over forty active local groups. In effect, there's barely a town in the country that doesn't have a nearby skeptical presence.

The organic growth of the U.K. skeptical scene arguably demonstrates both the strength and weakness of a bottom-up, decentralized movement. Apparently uniquely across the skeptical world (or certainly across Europe and North America), there is no official organization at the head of my country's skeptical efforts. With no central body determining what can and can't be done, local chapters run autonomously, making the barrier to entry as low as the ability to find an adequate venue and to book a suitable speaker. This openness has undoubtedly done wonders for the rapid growth of the U.K. skeptical community in the past decade.

The inevitable downside to a movement with no center is a lack of a figurehead to drive activism and direct enthusiasm into effective pursuits, meaning opportunities to counter pseudoscience directly and publicly sometimes pass by, with local groups focusing their energies on their own local activities. This downside is certainly not insurmountable if approached correctly. In fact, within a year of the formation of the Merseyside Skeptics Society, we had started the 10:23 Campaign—a series of publicity-raising stunts designed to drive home to the public the inefficacy of homeopathic remedies (a pseudoscience that carries a particular embarrassment for British skeptics, given the U.K. government's support for homeopathy in the National Health Service (NHS) to the tune of some £4 million, nearly $6 million).

The stunt itself was nothing new: taking a homeopathic "overdose" in order to highlight that the remedies contained nothing but sugar. What made our plan different from previous, similar stunts was the scale: we aimed to have skeptics all across the country taking a public "overdose" at precisely the same time, at 10:23 AM (the time being a reference to the Avogadro constant, which can be used to explain the inert nature of homeopathic products). To achieve this goal, we needed to convince skeptical groups around the country to get behind our plan and to join us. Fortunately, as I've seen on many occasions since, when you approach a skeptical group with an appeal for support rather than a prescriptive diktat, you invariably find a passionate, enthusiastic, and warm response. More often than not, skeptics want to help and want to be part of an idea they can see the value of.

Our 2010 10:23 Campaign was an overwhelming success, with 300 skeptics in thirteen cities swallowing sugar pills in illustration of the cause. The stunt garnered national attention, remaining the top story on the BBC website for the whole day and appearing in every national

newspaper. So successful was the campaign that in 2011—astonishingly, in retrospect, less than two years after we first founded the Merseyside Skeptics Society—we took the campaign worldwide, approaching every skeptical group we could find, offering the same appeal for enthusiasm, aid, and action. On February 6, 2011, 1,700 skeptics in seventy cities across thirty-two countries—including a research scientist in Antarctica—collectively took part in a stunt that was dreamt up by a small, local group in Liverpool one afternoon. As one illustration of the effect, sales of homeopathic products across all of Poland fell by 17 percent after the 10:23 Campaign made the national news there.

As successful as the 10:23 Campaign was, NHS funding of homeopathy in the United Kingdom was far from defeated. This, perhaps, is the biggest downside to an autonomous and decentralized skeptical community: only so much can be achieved with limited volunteer time, and volunteers rightly focus their attention and activism where their interest takes them. It is the skeptic's lot to repeatedly tread old ground, as long-debunked ideas require constant re-skewering. For some skeptics, this same-old familiarity can breed fatigue, and names once-synonymous with a cause drift away as real life and other interests take precedent.

The ability to circumvent that fatigue is one of the real strengths of having a dedicated and professional skeptical body, which is why I was so delighted to become possibly the country's only full-time skeptic when I became the project director of Simon Singh's charity The Good Thinking Society in 2014. Among the many projects we've undertaken in the past two years has been to systematically chase up and challenge the funding of homeopathy by the NHS, going deeper into the specifics of funding agreements, health policies, and commissioning processes than any voluntary skeptic has had the time, interest, and expertise to do in the past. In doing so, we've been able for the first time to accurately expose where in the country public funds are spent on homeopathy and to work with lawyers to bring legal challenges against regional funding decisions with encouraging signs of success.

It is the skeptic's lot to repeatedly tread old ground, as long-debunked ideas require constant re-skewering.

The space to methodically and tactically investigate has, for perhaps the first time, put homeopathy's place on the National Health Service under genuine pressure, with our first real major victory coming in June of this year when NHS Liverpool agreed to end homeopathy funding in the city as a direct result of our campaigning. We intend to keep that pressure up around the rest of the country, and having the time and the manpower to stay on top of this issue gives us a genuine chance of a positive outcome. And, naturally, our chances of success are amplified enormously by having the support of a vibrant and passionate skeptical community.

If our chances of dislodging homeopathy from the public purse once-and-for-all give me cause for cautious optimism, we certainly can't afford to be complacent. Skepticism is still a growing movement, accelerated by the advent of social media but still finding its feet as a broader social phenomenon. There have been growing pains, and to a degree those are inevitable. Some skeptical positions even appear to have penetrated the mainstream: when I first became an active skeptic in 2009, it seemed like the public overwhelmingly conflated the term *homeopathic* with *herbal* or *natural*—indeed, this was the very point the 10:23 Campaign aimed to address in the public consciousness. These days, comedians have entire routines based on the nonsensical tenets of homeopathy—and popular routines at that.

Perhaps the skeptical message is starting to break through. Or, perhaps, that may simply be confirmation bias. I'll withhold judgment until I have more data. After all, I am a skeptic. ■

Michael ("Marsh") Marshall is the project director for the Good Thinking Society, a U.K. charity headed up by Simon Singh. He is also the vice president of the Merseyside Skeptics Society, lectures at a number of U.K. universities on journalism and ethics, and regularly interviews proponents of pseudoscience for the *Be Reasonable* podcast.

Committee for Skeptical Inquiry Timeline, 2001–2016

For the twenty-fifth anniversary observance of CSICOP (now CSI) and the *Skeptical Inquirer* in 2001, we published "A CSICOP Timeline: A Capsule History in 85 Easy Steps" in our May/June 2001 issue. You can find it on our website at http://www.csicop.org/si/show/csicop_timeline. The timeline covered a series of highlights, among them our founding at SUNY Buffalo April 30–May 1, 1976, and publication of the first issue of SI (initially called The Zetetic) that fall; news in 1978 that CSICOP was generating "tremendous enthusiasm" among scientists, scholars, media, and the public; the start of construction of a new building, the Center for Inquiry, in Amherst, New York, in 1990; court sanctions imposed against Uri Geller in 1992 for prosecuting a "frivolous" case against CSICOP; CSICOP's campaign calling for newspaper astrology-column disclaimers; various announced expansions of our mission; adding the subtitle "The Magazine for Science and Reason" to the *Skeptical Inquirer* in 1994; our increase from a quarterly to bimonthly publication and from digest-size to magazine-page size in 1995; asteroids Skepticus 6630 and Kurtz 6629 named for CSICOP and its founder Paul Kurtz in 1996; cover stories on CSICOP investigative delegations to China in 1988 and 1996; SI's first "Science & Religion" issue in 1999; our January/February 2000 cover story on ten outstanding skeptics of the twentieth century; and reports on our many CSICOP conferences over the years, national and international.

Here now, in observance of our fortieth anniversary, is an update of that timeline adding key events over the most recent fifteen years.

2001

July

Skeptical Inquirer republishes Ray Hyman's classic "Proper Criticism," long an influential guide to good skeptical investigation.

September

Second SI "Science & Religion" issue includes articles by Arthur C. Clarke, James Lovelock, Steven Weinberg, and Neil deGrasse Tyson.

October 3–5

CSICOP and the Russian Academy of Sciences cosponsor a special international conference in Moscow on "Science, Anti-Science and the Paranormal." CSICOP's Paul Kurtz cochairs with two distinguished Russian scientists, Valerii Kuvakin and Edward Kruglyakov. A plenary session adopts a formal resolution "Against Antiscience, Charlatanism, and Irrationalism in Russia," published in the July/August 2002 SI along with articles by Kurtz, Kruglyakov, and Russian astronomer Yuri N. Efremov.

A Quarter Century of SI Covers, 1976–2001, displayed.

2002

June 20–23

Nearly 500 people attend CSICOP's Fourth World Skeptics Congress in Burbank, California. It features sessions on confidence games and financial scams, evolution and intelligent design, urban legends, fringe psychotherapies, space age pseudoscience, plus concurrent sessions that challenge attendees' choices and flexibility.

September

On the first anniversary of the 9/11 terrorist attacks on New York and Washington, DC, SI's cover article, "A Skeptical Look at September 11" by Clark R. Chapman and Alan W. Harris, examines reactions to the attacks and calls for evaluating such situations more rationally so as not to multiply the damage by inducing irrational fears. The article invoked tremendous controversy. It is republished in *The Best American Science and Nature Writing 2003*, edited by Richard Dawkins, who in his introduction says the article "far from denigrating the tragedy, offers hope" and is "a type specimen of how the scientific way of *thinking* might influence our lives for the better."

2003

March

Skeptical Inquirer subject index is improved and placed online.

June 21

Ann Druyan and Elizabeth Loftus speak at a small conference "The Assault on Reason" marking the opening of the new auditorium of Center for Inquiry–West in Los Angeles. Druyan's remarks become a cover article, "Ann Druyan Talks About Science, Religion, Wonder, Awe . . . and Carl Sagan," in the November/December 2003 SI.

November 23–26

CSICOP conference "Hoaxes, Myths, and Manias" is held over four days in Albuquerque, New Mexico, with sessions on Internet scams, urban legends, Planet X hoaxes, and the Bible Code. Speakers include Eugenie Scott, Kenneth Feder, Robert Carroll, Jan Harold Brunvand, Wallace Sampson, Phil Plait, Dave Thomas, and Eric Krieg. Ray Hyman is presented CSICOP's In Praise of Reason Award.

2004

March

SI publishes its third special "Science & Religion" issue, including articles by Pascal Boyer, Paul Kurtz, Taner Edis, Susan Haack, and Walter Isaacson.

CSICOP Fellow Elizabeth Loftus is elected to the National Academy of Sciences; CSICOP Fellows Steven Pinker and Jill Tarter are among *Time* magazine's 100 most influential people in the world; and CSICOP Fellow Neil deGrasse Tyson is set to host a four-part NOVA miniseries, *Origins*.

October 8–10

Fifth World Skeptics Congress, spon-

sored by CSICOP and its Italian counterpart, CICAP, is held in Abano Terme, Italy, near Padua, "in the land of Galileo," with a sold-out attendance of 500. The theme is "Solving Mysteries." Galileo's legacy shines throughout with special event "The World of Galileo Galilei," featuring Italian physicists and historians discussing his contributions and demonstrating his experiments. Another highlight is "A Magical Evening with James Randi," an extended on-stage conversation between Randi and protégé and SI columnist Massimo Polidoro.

2005

January
CFI announces a 13,600-square-foot expansion of its Amherst, New York, headquarters; a New Future Fund capital campaign funds it.

November
SI publishes a special issue on "Evolution and the Intelligent Design Wars" with eleven articles, commentaries, reports, and statements.

September 17–18
CSICOP cosponsors (with CFI and *Pensar* magazine) the First Ibero-American Conference on Critical Thinking in Buenos Aires, Argentina.

2006

March
A special event celebrating CSICOP's thirtieth anniversary and the dedication of CFI's new building in Amherst is held there March 31–April 1, 2006.

SI hails U.S. District Judge John E. Jones III's landmark *Kitzmiller v. Dover* ruling that intelligent design is not science and that teaching it is unconstitutional. We publish extended excerpts from his ruling. CSI Fellows Barbara Forrest and Eugenie Scott are among those instrumental in bringing about that reasoned outcome.

May
CSICOP announces winners of its first Robert P. Balles Prize in Critical Thinking: Ray Hyman, Joe Nickell, and Andrew Skolnick for articles in the May/June 2005 Skeptical Inquirer on "Testing the Girl with X-Ray Eyes."

Ken Frazier's "In Defense of the Higher Values" commentary, based on his talk at the CSICOP thirtieth anniversary observance, is published in the July/August SI.

June
CSI's second Robert P. Balles Prize in Critical Thinking goes to Ben Goldacre for his weekly column, "Bad Science," in *The Guardian* (UK).

September
On the thirtieth anniversary of first publication of the Skeptical Inquirer, philosopher and CSICOP founder and chairman Paul Kurtz does a major review and reappraisal of SI and its impact, "Science and the Public: Summing Up Thirty Years of the Skeptical Inquirer."

November
SI publishes a special issue on "Science + Art," dealing with the science of art, the art of science, science in art, and art in science, all guest-edited and introduced by Austin Dacey. The lead article is by Steven Pinker.

2007

January
CSICOP's Executive Council announces that the organization's name has been shortened from Committee for the Scientific Investigation of Claims of the Paranormal (CSICOP) to the Committee for Skeptical Inquiry (CSI). CSI's mission statement is also revised to replace "investigation of paranormal and fringe-science claims" with the broader "investigation of controversial or extraordinary claims." The changes (approved at an Executive Council meeting September 27, 2006, in Oak Brook, Illinois) are announced and elaborated on in the January/February 2007 SI. Reasons stated include the desire for a shorter name, dislike of association with the word *paranormal*, and a determination to emphasize "critical inquiry, scientific thinking, and the scientific outlook." Founder and chairman Paul Kurtz adds an editorial, "New Directions for Skeptical Inquiry. "

March
SI publishes a special expanded issue on "Science, God, and (Non)Belief," opening with the new CFI Declaration in Defense of Science and Secularism and with articles by, among others, Frederick Crews, Alan Dean Foster, Michael Ruse, Daniel C. Dennett, Mark Newbrook, and the late Carl Sagan.

March 31
Members of the CSICOP Executive Council speak on "Restoring Scientific Integrity" at a morning session in CFI's new Office of Public Policy on Capitol Hill in Washington, DC.

May–September
With the cover article "Global Climate Change Triggered by Global Warming" by NASA scientist Stuart A. Jordan and a news report on the latest IPCC Climate Report showing "unequivocal" warming, SI begins its coverage of—and enters into the fray over—climate change and the resistance to climate science. Negative reader reaction begins immediately. Many who email and write are furious, others "disappointed"; they say they wanted SI to "debunk" climate science, not support it. In an editor's column in the next issue, SI's editor says science goes where the evidence leads and the magazine will continue to present and evaluate the "best evidence" on climate change. In a special five-page Follow-Up section in the September/October issue, SI publishes a number of those critical letters, some cancelling their subscriptions, plus several supportive letters and a lengthy reply from author Stuart Jordan.

October 13–15
World Congress on Scientific Inquiry and Human Well Being, cosponsored by CFI and the Chinese Research Institute for Science Popularization, is held in Beijing, China. Eminent speakers include CSI Fellows Paul Kurtz, Murray Gell-Mann and Sir Harold Kroto (both Nobel laureates), Daniel Dennett, Lawrence Krauss, and Lin Zixin. China's speakers include geographer and climatologist Qin Dahe, a member of the IPCC Working Group I on the physical science basis of climate change, who had just learned of the group's cowinning the 2007 Nobel Peace Prize.

November
SI publishes a special three-article section on Vaccines and Autism: Myths and Misconceptions.

2008

January
SI publishes a three-part report on Chiropractic and Homeopathy: Under the Microscope.

June
CSI's third Robert P. Balles Prize in Critical Thinking goes to *New York Times* science writer Natalie Angier for her book *The Canon: A Whirligig Tour of the Beautiful Basics of Science*.

December 2008
Ronald A. Lindsay, a PhD philosopher and a lawyer, is named president and CEO of the Center for Inquiry, home to CSI and the Council for Secular Humanism (CSH). Founder Paul Kurtz remains chairman of all three organizations for the time being. Thus begins a difficult three-year period of transition to a permanent new leadership structure for the combined organizations.

2009

January
Countering a contention that UFOs are passé, SI devotes most of its January/February issue to "The New UFO Interest: Scientific Appraisals," beginning with "UFOlogy 2009: A Six Year Perspective" by Robert Sheaffer and followed with articles by David Morrison, James Oberg, Dave Thomas, Andrew Fraknoi, James McGaha, Kingston A. George, and three French scientists on thirty years of official UFO studies in France—plus UFO-related regular columns by Joe Nickell and Sheaffer. The articles touch a nerve with UFOlogists, who pillory our authors with a series of online personal attacks.

February
The Skeptical Inquirer Facebook page, edited by Barry Karr, is started. It soon becomes a leading online source of news on science and skepticism; Karr begins an SI Twitter feed the next month.

April
CFI's Twelfth World Congress is held in Bethesda, Maryland, with a session on Darwin, Lincoln, evolution, and ID and talks and other sessions on defending science against political interference, the history and future of the universe, the science of climate change, skepticism and science, and the future of skepticism. Major awards are presented to Paul Kurtz, James Randi, and Lawrence Krauss.

May
SI publishes noted climatologist Stephen H. Schneider's succinct "Climate Change: Skeptics vs. Deniers," presaging a statement signed by a majority of CSI fellows six years later.

June
An anthology of thirty-nine articles from the Skeptical Inquirer, *Science Under Siege: Defending Science, Exposing Pseudoscience*, is published by Prometheus Books. Three broad areas are covered: Science and Skeptical Inquiry; Critical Inquiry and Public Controversies; and Understanding Pseudoscience, Investigating Claims.

July
CSI's fourth Balles Prize in Critical Thinking goes to physicist Leonard Mlodinow for his book *The Drunkard's Walk: How Randomness Rules Our Lives*.

October 9–11
CSI sponsors a three-day workshop on "UFOs: The Space-Age Mythology" in Tucson, Arizona.

November
SI publishes a special issue on "Skepticism 2.0" guest-edited and introduced by Ben Radford with essays by a new generation of skeptics: Daniel Loxton, Reed Esau, D.J. Grothe, Tim Farley, Jeff Wagg, Blake Smith, Karen Stollznow, Timothy Binga, Justin Trottier, Barry Karr, and Heidi Anderson. In another first, an alternative version of the cover is posted online.

November
SI begins publication of its first regular humor page, "The Last Laugh." Ben Radford edits.

2010

January
CSI collects eighteen Skeptical Inquirer articles by or about Carl Sagan and places this entire "Carl Sagan Collection" on its csicop.org website.

March
Fifteen notable figures in science and skepticism are elected fellows of the Committee for Skeptical Inquiry—the largest number of new fellows elected at one time since the Committee's original founding. James Randi returns as a CSI fellow.

June
In an editorial, "The Winter of Our Discontent," SI's editor begins, "This has been quite a winter of discontent for climatologists and climate science. Seldom has an entire scientific field been subject to such a concentrated barrage of bad news and external attacks. . . ."

May 22
Martin Gardner, one of the revered founders of modern skepticism and longtime CSICOP Executive Council member and SI columnist, dies at age ninety-five; the September/October SI publishes fifteen pages of tributes.

July
CSI's Balles Prize in Critical Thinking goes to *New Yorker* staff writer and author Michael Specter for his book *Denialism*.

October 9
CSI Executive Council meets for the first time in several years in Los Angeles and discusses plans for increasing reach and visibility of CSI and SI.

Fall
CFI branches and numerous skeptics groups celebrate the thirtieth anniversary of Carl Sagan's *Cosmos* and the second Carl Sagan Day (November 9) with a variety of events around the country.

2011

January
CSI and CFI issue a joint statement about Walmart's "irresponsible marketing and promotion" of ineffective homeopathic "flu medicine" Boiron Oscillococcinum.

March
CSI announces election of twelve more fellows from five countries.

April 1–2
CSI Executive Council, meeting in Denver, establishes "A Pantheon of Skeptics"—a roster of twenty-seven distinguished deceased fellows of the Committee for Skeptical Inquiry. They include Isaac Asimov, Steve Allen, Francis Crick, Martin Gardner, Carl Sagan, Glenn T. Seaborg, and B.F. Skinner. The Pantheon is published in the July/August SI and on the csicop.org web site.

July
Steven Novella, MD, of Yale University School of Medicine is honored with CSI's Robert P. Balles Prize in Critical Thinking "for your tremendous body of work including the *Skeptics Guide to the Universe*, *Science-Based Medicine*, *Neurologica*, your Skeptical Inquirer column 'The Science of Medicine,' as well as your tireless travel and lecture schedule on behalf of skepticism."

SI publishes four articles on "9/11 Conspiracy Theories: Ten Years Later."

Robert Sheaffer publishes a book of his SI "Psychic Vibrations" columns from

1977–1997, titled *Psychic Vibrations*, with cartoon illustrations from SI by Rob Pudim.

September
SI publishes the first of a three-part series on "Civilizations Lost and Found: Fabricating History" by CSI Fellow Kenneth Feder and three anthropologist/archaeologist/historian colleagues.

October 27–30
CSI launches a new conference series with CSICon 2011 in New Orleans, dedicated to "scientific inquiry and critical thinking." Bill Nye is keynote speaker and given the "In Praise of Reason Award," CSI's highest award. Previous recipients include Carl Sagan, Murray Gell-Mann, Stephen Jay Gould, Martin Gardner, Ray Hyman, and James Randi. Executive Director Barry Karr later reports attendees' comments have been "amazingly positive and overwhelmingly enthusiastic."

November
In a report "Culling Non-science from Scarce Medical Resources," authors Eugenie V. Mielczarek and Brian Engler examine all research by the National Center for Complementary and Alternative Medicine and find no discoveries that justify spending further taxpayer dollars to maintain its existence. Their results are published as cover article "Measuring Mythology" in the January/February 2012 Skeptical Inquirer.

2012

January
With no fanfare, the Skeptical Inquirer begins publishing in full color on inside pages.

May 18–20
The Sixth World Skeptics Congress, cosponsored by CSI, the European Council of Skeptical Organizations, and the German skeptics group GWUP, is held in Berlin. Participants include Eugenie Scott, Ray Hyman, James Alcock, Harriet Hall, Chris French, Simon Singh, Massimo Polidoro, Chris Mooney, and Amardeo Sarma. A joint resolution expresses deep concern about "the growing tolerance, acceptance, and even promotion of pseudoscientific and occult ideas and practices within scientific, academic, and educational institutions."

June
CSI's Balles Prize in Critical Thinking goes to Richard Wiseman for his book *Paranormality*.

September
SI publishes a special issue on "Art and Skepticism," edited by Ben Radford. Ten contributors represent a variety of approaches to science, skepticism, and art.

October 20
Paul Kurtz, founder of CSI, CSH, and CFI, philosopher, prolific author, and international leader of the modern skeptical and humanist movements, dies at age eighty-six. A subsequent memorial service on the Amherst campus of the State University of New York at Buffalo hears dozens of friends and colleagues speak and lasts an entire day. Twelve pages of tributes from colleagues are published in the January/February 2013 Skeptical Inquirer.

October 25–28
CSI's second CSICon conference, dedicated to founder Paul Kurtz, is held in Nashville. Richard Wiseman emcees. Speakers include Lawrence Krauss, Anthony Pratkanis, Carol Tavris, David Gorski, Sara Mayhew, Chris Mooney, Jon Ronson, Elizabeth Loftus, Massimo Polidoro, Indre Viskontas, and Joe Nickell. Plus a live two-hour taping of *Skeptics Guide to the Universe* podcast with Steven Novella and colleagues.

2013

January
Physician Harriet Hall and Steven Novella join CSI's Executive Council. Five new CSI fellows are elected.

June
Biomedical engineering professor and *Forbes* columnist Steven Salzberg and CSI Senior Research Fellow Joe Nickell each receive CSI's Robert P. Balles Prize in Critical Thinking, announced in June and presented at the CFI Summit in October.

Three CSI fellows receive prestigious national awards: The American Psychological Association awards its 2013 Gold Medal Award for Life Achievement in the Science of Psychology to Elizabeth Loftus; NASA awards its NASA Exceptional Achievement Medal to David Morrison "for exceptional achievement in exposing the 2012 doomsday hoax"; and Eugenie C. Scott receives an honorary doctorate, her ninth, from Chapman University for her "work . . . in advancing the public understanding and acceptance of evolution."

October 24–27
The CFI Summit, a joint conference of CFI and its affiliate organizations CSI and CSH, incorporating CSICon 3, is held in Tacoma, Washington. The keynote speaker is Bill Nye. Others include Susan Jacoby, Eugenie Scott, Richard Wiseman, and Leonard Mlodinow. Eugenie Scott is presented the CFI/CSI Lifetime Achievement Award.

November
Kendrick Frazier's commentary "Why We Do This: Revisiting the Higher Values of Skeptical Inquiry" is published in the November/December Skeptical Inquirer.

2014

June
Paul Offit, MD, noted medical scientist and vaccinations proponent, receives CSI's Balles Prize in Critical Thinking for his book *Do You Believe in Magic? The Sense and Nonsense of Alternative Medicine*.

June
CFI launches new "Keep Health Care Safe and Secular" campaign with the goal of keeping pseudoscience and religion out of health care.

July
The first SI "Science and Religion" issue in seven years opens with "Would the World Be Better Off Without Religion? A Skeptics Guide to the Debate," by Scott Lilienfeld and Rachel Ammirati. It generates strong reader response. Other articles are by Barry Kosmin, Harriet Hall, Ryan Shaffer, Mark Rubinstein, and Charles M. Wynn Sr.

September
SI publishes two interviews with Ann Druyan, hailing the new television series *Cosmos: A Spacetime Odyssey*, which she and collaborators created, wrote, and produced. It wins four Emmy Awards.

November
SI announces it will celebrate the centennial of Martin Gardner's birth by republishing some of his classic Skeptical Inquirer columns. It begins with his first, "Lessons of a Landmark PK Hoax," from Summer 1983, about James Randi's Project Alpha.

December
"Deniers Are Not Skeptics" statement, signed by forty-eight CSI fellows and issued by CSI, generates worldwide discussion. It calls on news media to stop using the word *skeptic* for those who refuse to accept the reality of climate change.

2015

January
Committee for Skeptical Inquiry and its sister organization Council for Secular Humanism formally merge into Center for Inquiry, both becoming programs of CFI. No change to CSI's mission or SI's content.

March
Ronald A. Lindsay announces he will step down at end of 2015 as CFI president and CEO; later in the September/October SI, he writes an upbeat article on the future of the organization as a leading and much-needed advocate of critical thinking and inquiry.

An extended Commentary, "Organized Skepticism: Four Decades . . . and Today" by Kendrick Frazier, gives perspective on forty years of scientific skepticism worldwide.

April
Drawing on expertise from CSI medical experts, Michael De Dora presents CFI's invited testimony at an FDA hearing in Washington urging the agency to regulate homeopathic products.

May
SI publishes special issue on "Medical Misinformation." Six articles deal with promotion of dangerous pseudoscience as medicine by anti-vaccination people, quack health gurus, scientific journals, and even entire governments.

June
CFI "Reason for Change" conference held at founding site, Amherst, New York, blends scientific skepticism and secularism/humanism. Featured sessions on GMOs, Crank Anthropology, Alternative Medicine, Climate Change, and Philosophers on Science . . . and God.

CSI Executive Council meets at conclusion of CFI conference in Amherst—a public session in the morning, a business meeting in the afternoon.

CSI announces $25,000 challenge to Heartland Institute about reality of climate change, if thirty-year moving average of global land surface temperatures is not higher at the end of 2015 than at end of 2014. Heartland doesn't take up the challenge.

July
Two CSI Balles Prizes in Critical Thinking are awarded: one to the creators, producers, and writers of *Cosmos: A Spacetime Odyssey* and one to CSI Fellow and chemist Joe Schwarcz for his book *Is That a Fact?*

August 17
In comments filed with the FDA, CFI again urges the FDA to subject homeopathic drugs to the same testing requirements as conventional drugs.

September 25
The Associated Press announces a change in its widely used *AP Stylebook* as a result of CSI's December 2014 "Deniers Are Not Skeptics" statement. Those who don't accept climate science or dispute man-made global warming should no longer be called "skeptics," the AP said, but "climate change doubters or those who reject mainstream climate science." The announcement specifically refers to the Committee for Skeptical Inquiry's concerns that nonscientists who reject mainstream climate science have improperly usurped the word *skeptic*. The stylebook change becomes a major worldwide news story.

November
CSI announces election of ten more distinguished scientists and scholars as fellows.

In an SI cover article, CSI Fellow Larry Kusche revisits the Bermuda Triangle "Mystery Delusion" he decisively debunked with a classic book forty years earlier.

CFI Library receives the Henry Gordon collection of books on magic and conjuring from the family of the late CSI fellow.

2016

January
Robyn E. Blumner, head of Richard Dawkins Foundation for Reason & Science (RDFRS), is appointed CEO of the Center for Inquiry; also announced is that the RDFRS will merge with CFI. Ronald A. Lindsay stays on as CFI president during the transition period.

Eight more CSI fellows sign "Deniers Are Not Skeptics" statement, bringing the total to fifty-eight, plus four CSI Scientific and Technical Consultants.

February
Skeptical Inquirer improves and expands its digital availability. SI is now available via Apple Newsstand and also on all other major platforms through the Pocketmags app. Subscribers can now access full issues of Skeptical Inquirer and download the appropriate app for their devices either online or through iTunes or other apps.

February
The twenty-fifth anniversary of CSI newsletter *Skeptical Briefs* in its current format; Barry Karr edited through 2000; Ben Radford has coedited or edited since then.

March
CFI brief to the U.S. Supreme Court argues that alleged expert scientific testimony used in implementing Texas's restrictions on abortion rights is "flawed pseudoscience" that the court cannot constitutionally rely on.

April 30–May 1
The fortieth anniversary of founding of CSICOP, now CSI.

July
CSI reports results of first professional reader survey of Skeptical Inquirer subscribers in years. They show strong reader approval for our credibility, interest, and usefulness and "several things to be concerned about."

October
Fortieth anniversary of publication of Vol. 1, No. 1, Fall/Winter 1976, of Skeptical Inquirer (initially named *The Zetetic*).

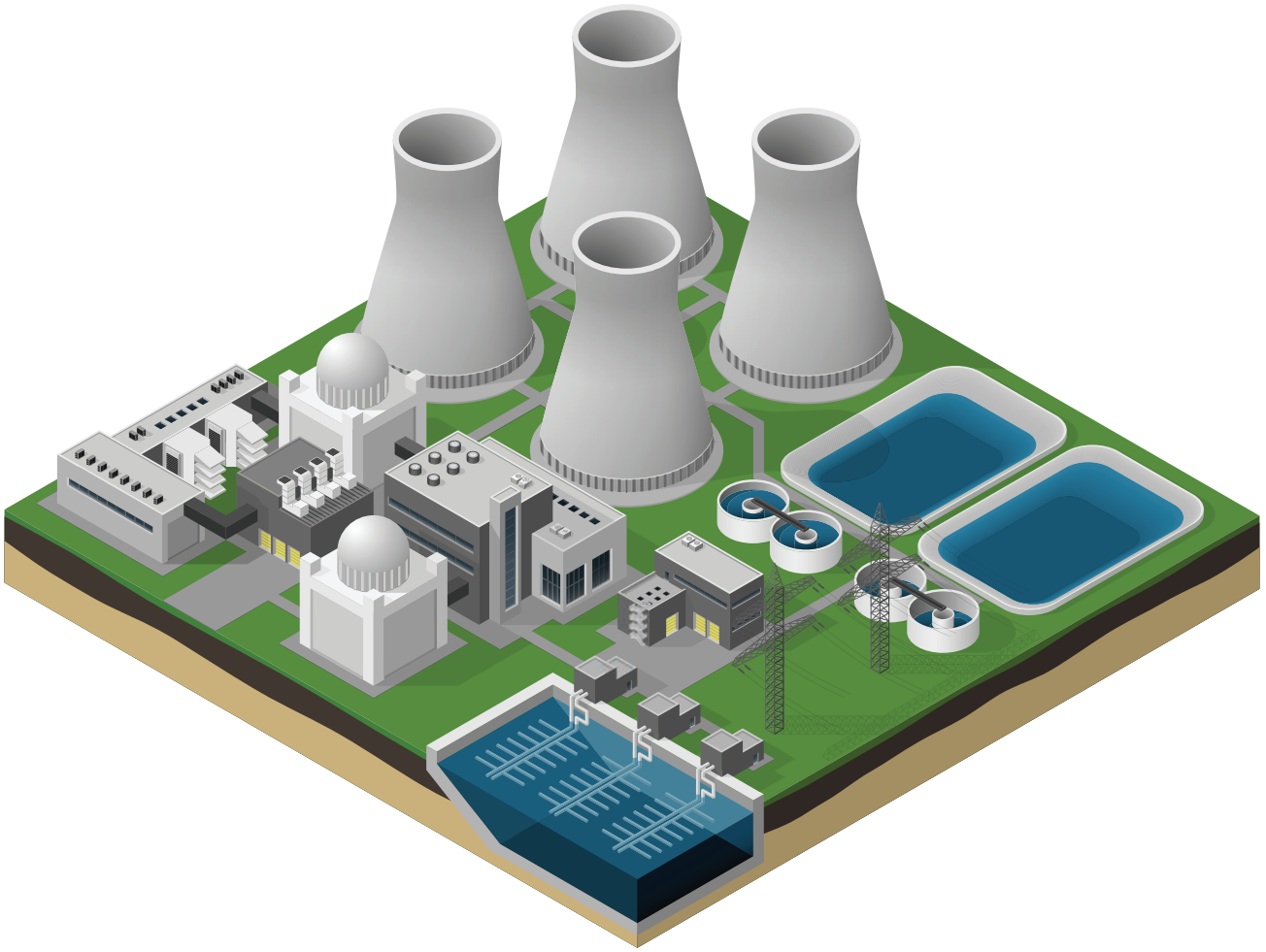
CSICon Las Vegas conference, October 27–30. Speakers include Richard Dawkins, Lawrence Krauss, Elizabeth Loftus, Eugenie Scott, James Randi, Maria Konnikova, Jill Tarter, and Paul Offit.

—Compiled by Kendrick Frazier
and the editors of Skeptical Inquirer

Nuclear Power and the Psychology of Evaluating Risk

Could it be that opponents of nuclear energy contribute to worsening global warming by failing to evaluate its risk rationally?

DANIEL A. VOGEL



With climate change and environmental devastation threatening the quality of human and nonhuman life, our minds inevitably turn to energy, in particular to alternatives to fossil fuels. Since the Cold War, environmental movements have had a tendency to lump nuclear energy with the horror of nuclear weapons. (Websites for Friends of the Earth, Greenpeace, and Sierra Club, for example, publish reports only on how "dirty" and "dangerous" nuclear power can be, without considering any opposing evidence.) This despite the fact that many green thinkers, well aware of nuclear energy's potential dangers, have attempted to argue for its at least short-term benefit in the face of the global warming challenge (including George Monbiot, Ansel Adams, Mark Lynas, Patrick Moore, Ted Nordhaus, Chris Goodall, Jeffrey Sachs, James Lovelock, and Daniel Blumstein to name just a few).

Laypeople such as myself who read science journals and attempt to keep an open mind about complex political realities are aware of several accidents at nuclear plants but are also facing the scientific evidence that nuclear power is, on average, extremely safe, environmentally clean, and plays virtually no role in heating up our planet (Biello 2013). It is difficult to maintain a skeptical position with so many ongoing opposing stances among our leaders (among Democrats, Hillary Clinton has spoken at various times either favorably or neutrally about nuclear power; Bernie Sanders, a significant promoter of renewables, has opposed it; Republicans, on the other hand, speak mostly in its favor and also support drastic deregulation of environmental protection and remain mostly, but not completely, deniers of global warming science itself).

It is thus reasonable to wonder if part of the opposition to nuclear energy is psychological in nature—rooted in problems about how we evaluate risk itself rather than entirely rational. We can consider this question even while we remain environmentalists who otherwise support attempts to overcome global warming through large-scale development of renewables, overcoming dependence upon petroleum and gas, improving conservation, reducing energy use, protecting wildlife, and exploring ways to reduce population and consumption. Most of us who read science articles and journals are aware that nuclear energy produces waste, and we know that it is radioactive rather than gaseous, the latter typically including such pollutants as carbon dioxide, sulfur, or mercury (Barett 2014).

I am thus intrigued that even evidence-based people discuss this issue in a hush, looking around to make sure nobody is listening. Could it be that the psychological effect of a word such as *radioactive* somehow seems so much harsher than that of words such as *mercury*, even though the latter contaminates fish (but, on the friendlier side, at times fills our teeth); *sulfur*, even though it is a dangerous air pollutant (but then again is also in our antidandruff shampoo); and *carbon dioxide*, even though it comprises 82 percent of our greenhouse gas emissions (National Research Council of the National Academies 2010) but is also what we breathe out and is that which plants trade for our valuable oxygen. I was puzzled that the United States had 100 nuclear power plants producing only 19 percent of its

We could of course attempt to balance the scary side of that word nuclear with the truly miraculous side, the one that saves lives thanks to X-ray and CT scans and radiation therapy for cancers.

energy yet is planning to build only six more by the 2020s despite the threat of global warming from fossil fuels.

However, to many people just the word *radioactive* seems to connote nothing at all nice. We think of Nagasaki and Hiroshima and of Marie Curie, the first female Nobel Prize winner who died of exposure to that which she studied. The terrifying thought of a nuclear explosion or bomb must so ignite our existential fear of death that we find it hard to separate it in our minds from nuclear energy, a form of power generation with the potential to promote life, if only by eliminating the various threats to it that fossil fuel–based energy poses to it at all times. We could of course attempt to balance the scary side of that word *nuclear* with the truly miraculous side, the one that saves lives thanks to X-ray and CT scans and radiation therapy for cancers, or that helps us determine the age of archaeological artifacts, can kill germs in sewage, and even treat our drinking water.

As someone in the clinical psychological field who is aware of the various cognitive distortions we humans engage in all the time, I became curious as to how we evaluate risk when we think of what is, after all, a flower of scientific genius born of the quantum mechanical revolution of the twentieth century. Human psychology renders politics very complex, since arguments are often fueled by emotion (Weston 2007), by poor logic that does not rely on statistics to support itself, and by numerous biases such as the confirmation bias in which people who hold a strong opinion will tend to promote all the apparent evidence that props it up without weighing that evidence against the facts that tear it down.

The Three Mile Island accident was the worst nuclear accident on United States soil, occurring in 1979, now more than a third of a century ago. In summarizing the effects, an Environmental Protection Agency (EPA) website says "the accident did not raise radioactivity far enough above background levels to cause even one additional cancer death among the people in the area, but measures of beta radiation were not included" (Perham 1980). The EPA found no contamination in water, soil, sediment, or plant samples. Quoting a 2008 article by the American Nuclear Society, the website further states that "the average radiation dose to people living within ten miles of the plant was eight millirem, and no more than 100 millirem to any single individual. Eight millirem is about equal to a chest X-ray, and 100 millirem is about a third of the average background level of radiation received by US residents in a year."

Human psychology renders politics very complex, since arguments are often fueled by emotion and by poor logic that does not rely on statistics to support itself.

The Chernobyl accident, seven years later in 1986, was vastly more destructive and is indeed considered the most severe nuclear power disaster of all, Fukushima included. Statistics provided by scientists of the United Nations (World Health Organization 2005; 2006) who evaluated the damage to human and nonhuman life show that twenty-eight workers in the plant died within a few months, and more than a hundred others developed radiation injuries. Initially 115,000 people in the immediate area were evacuated in 1986 with a subsequent evacuation of 220,000 from Belarus, the Russian Federation, and Ukraine. Up until 2005, there were around 6,000 reported cases of thyroid cancer of children or adolescents from those latter three locations who had been exposed at the time of the accident (as a side note, the American Cancer Society [2015] reports that five-year survival rates are near 100 percent for stages I and II, 93 percent for III, and 51 percent for IV). However, this nightmarish outcome seemed due in part to failure of the then-Soviet Union to follow proper safety protocols, as the apparent main cause of increase in the rate of thyroid cancer was the ingestion of milk containing abnormally high levels of iodine radionuclides. This should not have been, and in most civilized countries would not have been, permitted once the accident occurred. (With such statistics, we should also be mindful that they should be compared with the average expected cancer rate, rather than assuming all cancer was attributable to the same source; see the United Nations Scientific Committee on the Effects of Atomic Radiation 2008.)

Of 600 workers at the plant that fateful day, 134 received high doses; twenty-eight died within a few months,

and nineteen more died from 1987 to 2004. While all workplace-related deaths are tragic and should be minimized through improved safety standards, as industries learn from their mistakes, surely even these mortality figures from one of the world's only two serious nuclear plant accidents appear infinitesimal when compared to the annual mortality rates of other industries. In 2014 alone just in the United States, 248 people died in crop production, 156 in animal production, 181 in mining, 874 in construction, 341 in manufacturing, 159 in landscaping, and so on (Bureau of Labor Statistics 2014). We also need to consider the projected effects of global warming in likely affecting millions.

Unlike in Chernobyl, no fatalities seemed to have resulted in Japan from overexposure to radiation from the 2011 Fukushima plant accident. However, cancer risks were assumed to increase in the years to follow (Nebehay 2013). We must remember that it was a post-earthquake thirteen-meter-high tsunami that overcame the ten-meter-high power plant wall that contributed the most to this accident, a very serious—but clearly relatively avoidable—issue of construction location and one not likely to affect the vast majority of today's plants. (Japan's prime minister later condemned building the nuclear power plant so close to the coast.)

There are many more both relatively reassuring as well as relatively catastrophic accounts of the effects of this latter disaster on marine life. My goal is not to minimize the impact of the prior two major nuclear power plant accidents, all of which were highly unfortunate and should be intensely studied scientifically to maximize safety protocols of existing and future plants. My intention instead is to highlight the human problems in evaluating risk that may potentially and seriously impede overall safety.

How about comparing such risks with other activities with which we are most familiar? Crossing the road had 4,735 fatalities in 2013 in the United States (National Highway Traffic Safety Administration 2014). Sending our teens to play American football had just twelve fatalities in 2012 in America (Boden et al. 2013) but resulted in roughly 60,000 concussions (Saal 1991). Driving cars on the highway caused 35,200 car fatalities in 2015 in the United States (National Highway Traffic Safety Association 2016). Drinking alcohol resulted in 88,000 fatalities in the 2006 to 2010 period in the United States (Centers for Disease Control and Prevention 2015). Having sex causes 0.6 percent of all sudden deaths in the United States from such causes as subarachnoid hemorrhages, aneurysm ruptures, or sudden cardiac arrests (Banerjee 1996). Climbing a ladder resulted in 111 fatalities in 2011 in America (Centers for Disease Control and Prevention 2014).

It seems that when people evaluate the risks of nuclear energy, which as I have described certainly exist and should not be denied, they are often not evaluating the comparative risks upon climate change of not increasing nuclear energy even with those risks, assuming that it may play an important role in slowing down or reversing climate change trends and that other renewables may not be able to sufficiently accomplish that, which would be the risks of worsening climate change (frequent heat waves and heavy downpours, reduced water supplies, increased wildfires, insect outbreaks, tree die-offs, threats to agriculture and food supply, flooding of coastal regions, and soil erosion, according to Karl et al. 2009, disregarding their virtually incalculable economic costs). Those risks need to be compared with such costs as the tragic but relatively minimal effects to human life and environment of three prior nuclear accidents (which have in turn produced valuable information leading to enhanced safety protocols and improved reactor technologies). In fact, an over focus upon these three accidents while omitting the safety of the millions of days of use of the several hundred other plants is a bias with potentially serious consequences for our planetary future.

One bias commonly employed in this context is referred to as the "deformation professionnelle," in which peo-

An over focus upon these three accidents while omitting the safety of the millions of days of use of the several hundred other plants is a bias with potentially serious consequences for our planetary future.

ple tend to believe everything shared by their profession. However, in this case the term is being employed to mean that shared by their political perspective. In the 1970s and 1980s, for example, before the end of the Cold War, antinuclear weapon activists tended to similarly include nuclear energy as antilife, let alone anti-green. An omission bias seems at play too, focusing on the extremely rare but potentially very dangerous accidents and ignoring the benefits of all those times when nuclear energy plants worked well, which is most of the time. For example, France presently produces 75 percent of its energy from nuclear, has done so peacefully, is the world's greatest exporter of energy, and makes three billion euros a year doing so. Seventeen percent of its energy is actually from recycling nuclear fuel. In that sense, nuclear is an excellent renewable source (World Nuclear Association 2015).

There are risks millions of us take every day that vastly surpass that of operating Chernobyl and Fukushima on their worst days.

I hope I am not being too strong in stating that far too many antinuclear energy proponents meet the technical definition of an ideologue (defined on merriam-webster.com as "an often blindly partisan advocate or adherent of a particular ideology"). Increasingly today with our understanding of human psychology, we are beginning to appreciate the fact that particular ideological positions on events can express only partial truths precisely because of the confirmation bias involved. People who over-identify with ideologies but are poor in evaluating the benefits and weaknesses of their arguments tend to blind themselves to any of the strong stances against their own positions, opposition that they may find emotionally threatening.

This is why, as Daniel Kahneman, recipient of the 2002 Nobel Prize in Economic Sciences, has argued (Kahneman 2011), humans would more closely approach the truth by allowing their judgments to be informed by statistics, such as the few I have peppered throughout this article in an attempt to generate a comparative sense of dangers between the risks from prior nuclear accidents and rates of other fatalities that occur each and every year. That is how we may evaluate whether flying in a plane above the clouds, which often feels precarious (and has had its share of serious accidents), is vastly safer than driving in a car on solid ground (even including those accidents). In this vein, former President Bill Clinton stated that "the problem with any ideology is that it gives the answer before you look at the evidence" (Hungrycoyote 2012).

Germany is one of the industrialized countries (along with Japan) to have decommissioned nuclear power use as a response to its very vocal and large antinuclear movement. This has resulted in an apparently impressive development of renewable energy but an increased reliance on coal, adding significantly to its production of carbon dioxide, which it has pledged to reduce by 40 percent (Wilson 2014). In this case at least, antinuclear green rhetoric finds itself worsening rather than reducing our planetary woes, and thereby undermining its claim to the term *green*.

Anti-nuclear activists are surely not planning to boycott trains because thousands of Irish and Chinese lost their lives laying down their tracks in the United States in the 1860s, far more than died in the Chernobyl disaster that often feeds existing desires to boycott nuclear energy. The same may be said of the hundreds who have died even into modern times building skyscrapers. There are risks millions of us take every day that vastly surpass that of operating Chernobyl and Fukushima on their worst days, including riding highways to work or taking powerful medications with known benefits and costs.

Numerous books exist about the science of nuclear energy that may act as antidotes to public misinformation. A good one is *Prescription for the Planet* (Blees 2008). It discusses not only the integral fast reactor, which can recycle and generate vast amounts of energy safely from all existing nuclear waste (the buildup of which is often the pri-

mary reason for opposing nuclear), but also the plasma converter that has the potential to solve our garbage problem.

Both sides of the political spectrum seem to entertain blind spots that frustrate growth in this area. The Right/conservative wing tends to deny the very science of climate change while the Left/liberal wing tends to deny the very science of atomic energy, as it tends at times to do in other areas such as vaccines. Some liberals may associate vaccines with the corporate world (for example Big Pharma or corporate farming), which it tends to see as an unregulated enemy of the people, much as some conservatives may associate climate change with governmental regulation, which it tends to see as an enemy of free trade.

Promoting nuclear energy as a valuable option is not silencing the advocacy of other renewables such as solar, wind, geothermal, bioenergy, hydrogen, ocean (tidal and temperature), or of improved energy storage and conservation. Psychological science can assist such hard sciences as well in the realm of human behavior, for example in curtailing the mindlessly addictive acquisition and consumption of goods that are not likely to increase our happiness, in reducing our population, and in promoting ways of living based on meaning and wisdom. ■

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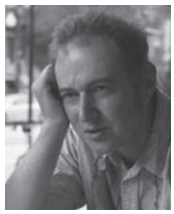

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Astrology's Bait of a Caring Cosmos

Geoffrey Dean's SI article "Does Astrology Need to Be True? A Thirty-Year Update" (July/August 2016) got me thinking back to the early 1980s when I learned to set up horoscopes using an ephemeris. I learned to debunk the art of reading someone's chart soon after, but Dean's SI article by the same title thirty years ago was a great help.

I noticed when doing a reading or having one done that astrology's complicated richness in variables allows for just about anything in interpretation. My conclusion was that a seasoned astrologer will never be wrong if that astrologer understands that the goal of a reading is to satisfy a client through agreement. Clients of astrologers reminded me of volunteers performing for a stage hypnotist. The latter entertainer requires people on stage willing to comply with suggestions whether they enter a trance or not, trance being relative to how much peripheral awareness remains in the volunteer. The horoscope with all its angles, symbols, and signs provides a distraction, a place to focus awareness in a cosmic playground that feeds into narcissistic traits—it is all about you that the starry sky universe cares about.

Any caring person wants the universe to care for them and talk to them whether through languages of religion or science. We coax nature to yield her remedies and she often does. This may be an artifact of reciprocity, one of the most basic moral principles in any religion or ethical social system. Astrologers tap this principle as bait using slogans such as "as above, so below" and "stars incline, they do not compel." Astrologers use the bait of a caring cosmos of stellar relationships underscored by mythological themes to invite their clients into a conversation with "the God" or "the Universe" that speaks through the astrologer. A curious client will likely find any number of useful or agreeable suggestions and insights—a few good ones are enough to justify the cost

So, what's the harm? The harm becomes apparent when the mask of authority falls off the face of a charlatan posing as the voice of the universe. Then the client wonders what nonsense he or she may have absorbed after so many often-expensive sessions with an astrologer: Have I been acting like a Virgo with an Aquarius ascendant because my chart under one system said I was one? Did my parents in India agree to arrange my marriage to an abusive man based on an astrologer's opinion? Turning to astrology is never neutral. It is an influence game with a host of labels and suggestions that can change behavior for better or for worse but under a constricted worldview. It is like pretending to pour the cosmos into a bottle and serving it up during a reading—something I have called metaphysical snake oil. Unlike the licensed therapist, the astrologer's art lays the entire responsibility on the client and her relationships with the stars. Thus, the astrologer can beg us to not blame the messenger if things do not work out based on the message.

Joe Szimhart
Birdsboro, Pennsylvania

Finishing "Does Astrology Need to Be True?" I've thought of another reason for doubt.

Every day, the sun, moon, stars, etc., shine down on us all equally. That also includes cosmic rays, solar wind, gravity, plus whatever else might be coming our way. If Saturn, for example, moves across the sky to where it is viewed in the constellation Pisces, wouldn't it, if it has any influence at all, influence everyone, not just those born years ago when Pisces was in the same place? An instructor of mine, fifty years ago, called astrology a "pseudoscience," and nothing has happened to change my mind since.

Carolyn Munn
Hayford, California

I'm mystified as to why critiques of astrology never seem to include what, to me, seems to be the most obvious one: Where did astrologers come up with their cause-effect relationships in the first place? For example, what first led *anybody* to believe that Venus had any influence over one's love life? And how did they go about verifying that hypothesis? Shouldn't the burden of proof for making such claims be on the people making them? Show your work, astrologers!

Richard S. Russell
Madison, Wisconsin

Climate Change and Science Denial

John Cook (a fellow of CSI) has used an analysis of the peer-reviewed scientific literature to estimate the degree of acceptance of anthropogenic global warming (AGW) among publishing climate scientists. His estimate was 97 percent, a number that has been widely quoted and that he continues to defend. The problem is that (1) most of his evidence is based on polls with small responses and not all from climate scientists; (2) the correct way to find out what scientists say is to use the scientific literature; and (3) scientists in mature fields are unlikely to state their adherence in their papers, the assumption on which Cook bases his 97 percent estimate.

James L. Powell (also a CSI fellow) has published a much more realistic analysis of publications in climate science ("Climate Scientists Virtually Unanimous: Anthropogenic Global Warming Is True," *Bulletin of Science, Technology and Society*, pp. 1–4, 2016, and in SI, "The Consensus on Anthropogenic Global Warming," November/December 2015). Powell argues that scientists who study climate change and publish in the climate literature implicitly accept the consensus view that such climate change is real. Why would they be working in this field if they did not accept this basic premise? Powell's analysis focuses, therefore, on the few published papers that contradict this consensus view. Depending on the assumptions he makes, the frequency of such dissent is well below 1 percent and arguably as low as 0.1 percent.

Cook has led the efforts in Australia to explain and defend climate science, and he has been subject to considerable abuse from climate deniers. Maybe 97 percent is good enough when battling those who deny any scientific consensus, but readers of SI deserve a more nuanced discussion. From the published literature, the dissent from the climate change consensus is nearly zero. AGW deniers, like evolution deniers, may make a lot of noise in the press, but they are very rarely to be found among the scientists actually publishing research.

David Morrison
(CSI fellow)
Saratoga, California

Scientists present information about global warming in an unconvincing fashion. We oversell. We have seen consensus before. Milk alleviates stomach ulcers, while eggs are bad, and margarine is good. Doctors (authority figures) get it wrong, so why should climatologists be believed?

We also undersell what we really know. CO_2 is visually transparent but absorbs and emits some infrared (IR) radiation. Some of the emitted radiation escapes, but the rest heats the atmosphere and Earth's surface. CO_2 effectively acts likes an insulator. We know that adding more CO_2 will warm Earth, but deter-

mining by how much is harder.

Is it significant? Earth's surface has an average temperature of about 290°C above absolute zero. The estimated warming is 1°C now, or less than 0.5 percent. Can a trace gas really block enough IR to make this big a difference? Consider the following. Paint containing 0.0002 ounces per square inch of pigment is nearly opaque; a column of air above a one-inch square contains 0.14 ounces of CO_2.

We know enough about the factors that affect climate to reasonably conclude that the warming we have seen is due to human activity, but future projections still cover a wide range. Do we wish to continue sailing on our present course when we already see clouds, and the forecast indicates that there may be a storm?

Robert Clear
Berkeley, California

In his article "A Skeptical Response to Science Denial" (July/August 2016), John Cook writes, "We found a number of studies . . . consistently finding a 97 percent consensus among publishing climate scientists on human-caused global warming." Setting aside the inherent wiggliness in concepts such as "publishing climate scientists" and "human-caused global warming," this is like somebody in 1600 claiming that 97 percent of philosophers agree Jesus Christ is divine. "What about the other 3 percent?" "Oh, the Inquisition hasn't caught them yet!"

If dissident climatologists are being intimidated into silence—and there is ample evidence they are—then the 97 percent figure becomes about as meaningful as a North Korean election return.

I'm old enough to remember the population scare of the late 1960s and early 1970s. In the end we learned that while population growth was real enough, it was not so much the "Population Bomb" that was supposed to have destroyed civilization by now. In the same way, we need to distinguish between the science of climate change and the scare tactics of political activists posing as scientists—or scientists engaging in political activism.

Taras Wolansky
Kerhonkson, New York

John Cook replies:

Skeptical Inquirer *received a number of letters in response to my article about consensus. Interestingly, we were accused of both overestimating and underestimating the level of scientific agreement that humans are causing global warming.*

In claiming we underestimate the consensus, David Morrison accused us of assuming that scientists who agree with the consensus will state it in their published research. We make no such assumption and in fact explicitly explore the issue of "no position" papers in Cook et al. (2013). Naomi Oreskes (2007) predicted that as a consensus strengthens, the proportion of no position papers should increase. Our analysis confirmed this prediction.

Nevertheless, it is important to avoid the incorrect assumption that every scientist who publishes a "no position" paper about climate change must endorse the consensus. This assumption of near-universal consensus necessarily leads to a conclusion of near-universal 99.9 percent consensus—a circular finding that conflicts with direct surveys of the climate science community. A number of studies, using a variety of sample sizes and methods, find around 3 percent dissension among climate scientists (Anderegg et al. 2010; Doran and Zimmermann 2009; Carlton et al. 2015).

Taras Wolansky implied that we overestimated the 97 percent consensus because "dissident climatologists are being intimidated into silence." The numbers actually point in the opposite direction, with intimidation of climate scientists resulting in their downplaying the implications of their research. Freudenberg and Muselli (2010) found that predictions by the Intergovernmental Panel on Climate Change were twenty times more likely to underestimate rather than overestimate climate impacts.

Wolansky also agrees with Robert Clear, who argues that consensuses have been wrong in the past so why should we trust the consensus on climate change now? We can rely on the consensus on human-caused global warming because its foundation is a consilience of evidence—many independent observations pointing to a single, coherent conclusion.

However, Wolansky does raise an important point—we need to distinguish between the science of climate change and political activism. The science of climate change can be found in the peer-reviewed scientific literature. This is the approach we took in our analysis of peer-reviewed studies of global climate change, which found 97 percent agreement on human-caused global warming.

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$E=mc^2$ and Mysticism

The banner (large type) excerpts in Sadri Hassani's article "Does $E=mc^2$ Imply Mysticism?" (July/August 2016) state: "It makes as much sense to say that energy is nonmaterial as to say that the greenness of grass or the blueness of sky is nonmaterial" and "Despite its primacy in mysticism there is no room for kaons in physics."

Regarding the first headline, greenness and blueness are regarded as secondary properties in Locke's sense, are private sensory experiences, and are generally regarded as nonmaterial nowadays (although getting any two philosophers to agree on something is like pulling teeth).

Regarding the second excerpt, the billions of K mesons (aka "kaons") out there will surely take umbrage at Hassani's exclusion of them from physics, as they have been particles in good standing ever since their discovery in 1947.

In fact, Hassani means to exclude Zen *koans* from physics, which he systematically misspells as "kaons." In view of the incompatibility of quantum mechanics and general relativity theory, nature may well be posing her own koans to us, and they're pretty tough ones.

Douglas M. Stokes
Ann Arbor, Michigan

I read Sadri Hassani's article, but when I got to the conclusion I was confused. He says "The E of *E=mc2* is always the energy of material particles that can either produce the mass on the right or be produced by the latter." But throughout the article, Sadri kept emphasizing that the mass of a photon is zero. If photons have zero mass, then the photon's energy is zero (multiplying zero by anything—even a number as big as the square of the speed of light—is still zero). And we know that photons have energy. New Agers absolutely love solar power. So—given that Einstein's equation is arguably the most recognizable in the world—the only logical conclusion is that photons do have mass. There is no mention in the article about rest mass, momentum, relativity, and quantum effects—or a more complicated version of Einstein's equation that uses velocity and momentum. I don't blame mystics for being confused.

Robert Felten
Los Gatos, California

The $E = mc^2$ article was easy to understand for me, an "artist" of the mechanical engineering persuasion and occasional scientist. A young man I often talk with has been rather deep into Eastern philosophy. I have found a way to start communication. He often uses the word *energy* other than as Mr. Newton would have suggested. It occurred to me to suggest to him that our disagreement was really only one of "semantics." We were simply using that word, and others, with different definitions in mind. That very quickly aided our communication without making him think his belief was under attack. We need more of that sort of persuasive technique at the level others will accept, please—not by abandoning the good technical content of SI, just enhancing our ways of helping communication a bit. Wishful thinking?

Lindley "Lin" Manning
Reno, Nevada

Sadri Hassani replies:

I appreciate Mr. Stokes's comment on the two excerpts in my article.

My point of emphasizing the nonmateriality of energy—as a property of a material object—was to debunk the mystics' propaganda that the material mass can turn into the nonmaterial energy. As the next to the last sentence of my article clearly indicates, a material object does not turn into energy but into other material objects carrying energy.

As for "kaon" versus "koan," I have to admit that it was an oversight on my part, which neither my dyslexic eyes nor my spell checker caught! Nevertheless, the second paragraph of the first quote on page 48, the context in which I subsequently used the word, and my frequent use of the word "paradox" as a substitute for "koan" should have indicated that my intention was Zen Buddhists' technique and not the elementary particles discovered in the 1950s.

Mr. Felten brings up an important point concerning the mass and energy of a photon, which was not emphasized in my article. The equation $E = mc^2$ *is the* rest energy *of an object that has mass (any mass). It should be thought of as stating the* possibility *of extracting E amount of energy out of m kilogram of mass. One kilogram of uranium sitting in a stockpile has no energy. But when it is made to enter in nuclear interactions, its mass can turn into energy, which is carried away by the nuclear particles produced in the interaction.*

A photon is always moving (by definition, at the speed of light) and therefore carries motional energy. This energy is, by the way, imparted to the photon when it is created. For example, when a neon atom emits a red photon (as in a red laser pointer), it transfers some of its internal energy to the photon. So, how does one explain the energy of a photon? We cannot use $E = mc^2$ *because this equation, as mentioned above, is good for objects at rest. It turns out that although* $E = mc^2$ *is the most famous equation in physics, it is not the most general. There is another relativistic equation, which includes the velocity v of the object, and therefore applies to all particles whether they are moving or at rest (the equation reduces to* $E = mc^2$ *when v is zero). This more general equation tells us that the energy E of a particle that has mass (any mass) becomes infinite if the particle moves at the speed of light. Therefore, no object with any mass can reach the speed of light. A proton with a mass of 0.00…00167 kilogram (26 zeros) has been accelerated to 99.9999991 percent of the speed of light in the Large Hadron Collider. And no physicist expects these protons to reach light speed regardless of how much they are accelerated further. So, if even the tiniest particle with mass cannot reach the speed of light, how can a photon move at the speed of light? The answer is that photon has no mass, because if it did, according to the equation mentioned above, it would have an infinite amount of energy, and that is not acceptable.*

Therefore, even though a photon carries energy, it cannot have any mass because it moves at the speed of light. In fact, any particle that moves at the speed of light is necessarily massless.

SI Reader Survey

In the July/August 2016 issue, our esteemed editor expresses surprise at the comparatively low levels of interest in the traditional subjects of SI, such as UFOs, cryptozoology, etc. However, when we keep in mind the high educational achievements of the readership, this should not be surprising: the traditional subjects have been so thoroughly explored that they no longer intrigue. Climate change, false memories, alternative medical modes, and others that attract more interest are all subjects that are less familiar and require more data and more rigorous analysis. Of *course* these attract higher interest.

But what will the next survey, ten years from now, yield?

Hewitt White
Falcon Heights, Minnesota

I appreciated finding out the stats on the readership. I'm wondering whether the low scores on conspiracy theories, superstition, UFOs, cryptozoology, and ghosts are due to the fact that, comparatively speaking, those things have less chance of ever being proven. I know I'm painting with a broad brush, but if someone claimed a novel way of moving items with one's mind or predicting future events, that just seems more likely (however slightly) than anyone producing a verifiable ghostly phenomenon. In other words, some things aren't just old hat, they're ancient hat.

I bought the whole set of SI's some time ago, and it's taken awhile to start reading from the beginning. Delightful to read Hyman, Randi, and others, both good friends and just merely acquaintances, back when we were all so young.

Steve Bauer
Portland, Oregon

On Obesity

Kenneth W. Krause takes on the important issue of obesity and comes to the conclusion that the obese need to make better decisions: "The power to choose is ours—at least for now." ("Science Watch," "Obesity: 'Fat Chance' or Failure of Sincerity?" July/August 2016).

I share Krause's skepticism about explanations for obesity that point to genetics, addictions, and or other biological causes, but I find his focus on weakness of will equally unsatisfying. None of these theories provides an explanation for the surge of obesity in recent decades.

According to the Centers for Disease Control, today approximately one third of U.S. adults are obese (body mass index of 30 or greater). Throughout the 1960s and 1970s, this figure was less than 15 percent. What has changed?

Biological explanations don't account for this trend because our physiology does not change that quickly. Similarly, an explanation that rests on personal choice and decision-making suggests today's Americans are morally or constitutionally weaker than those of previous generations. I doubt this is true.

A more plausible explanation for the increase in obesity would acknowledge the many changes in our economy and culture. Since the 1970s we have continued the transition from a manufacturing to a consumer economy. Today our economy depends on people selling things to each other, and a lot of those things turn out to be high in calories. Federal farm subsidies targeting grains (rather than fruits and vegetables) help keep the cost of unhealthy foods artificially low. Corn growers are the biggest benefactors of subsidies (over seven billion in federal dollars in 2014), and some of this subsidized corn comes back to us as high fructose corn syrup sweeteners and feed for meat animals. Part of the reason the five-dollar value meal is so cheap is that our taxes have already underwritten some of the cost.

It is also true that we are less active. We can buy our value meals and other fast foods at the drive-thru window without getting out of the car. But many of us who remember the 1960s and 1970s understand how much easier it was to be good back then.

We were thinner because daily life involved more movement and we had fewer high-calorie temptations. Cheap delicious food was not the pervasive cultural phenomenon that it is today.

A focus on weakness of will also has the effect of freeing the rest of us from any sense of responsibility to assist our fellow citizens. Many public health problems could be approached this way—for example, smoking and opioid abuse. We could just say that, like the obese, these people have just made bad decisions. But this approach ignores the effects of a person's social and economic environment on behavior.

Finally, it seems worth pointing out that recent scientific evidence challenges Krause's suggestion that we still have—or ever did have—the power to choose. The question of free will has been debated for centuries, but a number of recent studies by psychologists and neuroscientists suggest that our intuitive feeling of free choice is an illusion. It is probably an adaptive illusion, and as a result there may still be good reasons to hold people responsible for their actions—as if they had free will. But an appeal to bad choices as an explanation for human behavior may be a theory based on a fiction.

Stuart Vyse
Stonington, Connecticut

As the author of seven books on eating and weight and a psychotherapist with more than thirty years of experience treating dysregulated eaters with high weights, I'm disappointed that Kenneth W. Krause is promoting the concept that discernment of benefits and risks in the environment is going to change the thinking and behavior of this population. The truth is that while they might be highly rational in other areas, when it comes to biological imperatives such as eating, we cannot and should not expect rationality. People don't have mindless or overeating problems because they lack the ability to discriminate between what is healthy and unhealthy for them or whether or not they're being manipulated by culture or the environment.

The hundreds of eaters I've treated have irrational beliefs about eating, difficulty dealing with stress and distress (including from weight stigma), lack skills for effective life management, are often trauma or abuse survivors, have dysregulated their metabolism by chronic dieting, and have low self-worth. Moreover, considering "that 70% of the variation in peoples' weights may be accounted for by inheritance" (*Rethinking Thin* by Gina Kolata, Picador Press, 2007, p. 123), most of what we weigh is genetically predetermined. This is a far more complex subject than Krause portrays.

Karen R. Koenig-Loring
Sarasota, Florida

Tips on Trusting Science

In "The Do's and Don'ts of Trusting Science" (July/August 2016), author Faye Flam writes: "In the late 1980s, physicists claimed to have found a groundbreaking new form of energy known as cold fusion." The notorious duo "Fleischmann and Pons" were chemists, not physicists, so Flam's claim should be regarded as a mischaracterization. That is, the infamous press announcement was not made by physicists working in the field of nuclear physics but by electrochemists working with batteries or power supplies and liquids—scientists extending their work outside their zone of competence.

While the main lesson from this experience is indeed that science was utilized to sort things out, just as Flam also pointed out, there are other very valuable lessons in this story: Scientists working outside their areas of expertise can make huge blunders; theoretical physicists can "prove" just about anything (some notable physicists did rush in to try and explain the Fleischmann and Pons results); it is not wise to announce scientific advances at press conferences, and so on.

David Clark
Garland, Texas

[FEEDBACK

The letters column is a forum on matters raised in previous issues. **Letters should be no longer than 225 words**. Due to the volume of letters we receive, not all can be published. Send letters as email text (not attachments) to letters@csicop.org. In the subject line, provide your surname and informative identification, e.g.: "Smith Letter on Jones evolution article." Include your name and address at the end of the letter. You may also mail your letter to the editor to 944 Deer Dr. NE, Albuquerque, NM 87122.

There's much more available on our website!

Skeptical Inquirer

Here's just a sample of what you'll find:

Return of the Grief Vampire Tyler Henry
Wikipedia whiz Susan Gerbic takes a closer look at celebrity psychic medium Tyler Henry and his claims of talking to the dead in her special article.

Scoping the Sciences
LaRae Meadows examines how scientists and skeptics are using the social media app Periscope as a tool for making the ravine between scientific ignorance and scientific knowledge narrower in an effort to improve public understanding.

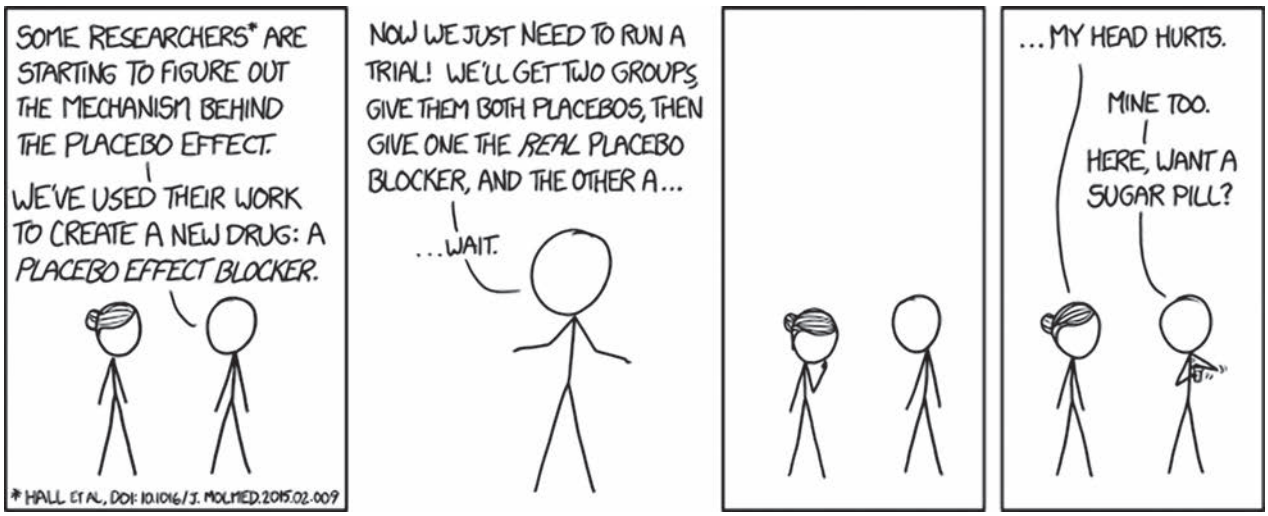
SKEPTICAL ANNIVERSARIES

by Tim Farley

November 4, 1936: After Richard S. Lambert was said to be "off his head" for believing in the bizarre Gef the Talking Mongoose case and other paranormal topics, he brings—and wins—a slander case in London High Court.
November 9, 1966: According to one version of the "Paul is dead" legend, Paul McCartney dies in a car accident on this day and is replaced by an (improbably talented) impostor.
November 15, 1966: Five people driving by the West Virginia Ordnance Works see what is now known as the cryptid Mothman.
November 24, 1971: The famous unsolved "D.B. Cooper" hijacking occurs on a Northwest Orient airplane over southwest Washington State.
November 30, 2006: The Committee for the Scientific Investigation of Claims of the Paranormal (CSICOP) officially changes its name to Committee for Skeptical Inquiry (CSI).
December 6, 1986: The first New Zealand national skeptics convention begins (a few months after the founding of the group) in Christchurch.
December 10, 1986: Creationism court case *Edwards v. Aguillard* is argued before the United States Supreme Court.
December 11, 2006: The International Conference to Review the Global Vision of the Holocaust begins in Tehran, Iran. Many holocaust denialists attend; the United States, Great Britain, the Vatican, and other governments condemn the gathering.
December 13, 1976: The first of a two part *New Yorker* article titled "Microwaves" by Paul Brodeur raises doubts about the safety of microwave radiation, sparking fears nationally.
December 15, 2006: The Hungarian national skeptics group Szkeptikus Társaság Egyesület is founded.

Tim Farley is the creator of the website whatstheharm.net. and blogs at skeptools.com. He is a past fellow of the James Randi Educational Foundation.

PLACEBO BLOCKER


SOME RESEARCHERS* ARE STARTING TO FIGURE OUT THE MECHANISM BEHIND THE PLACEBO EFFECT.
WE'VE USED THEIR WORK TO CREATE A NEW DRUG: A PLACEBO EFFECT BLOCKER.
* HALL ET AL, DOI: 10.1016/J.MOLMED.2015.02.009
NOW WE JUST NEED TO RUN A TRIAL! WE'LL GET TWO GROUPS, GIVE THEM BOTH PLACEBOS, THEN GIVE ONE THE REAL PLACEBO BLOCKER, AND THE OTHER A...
...WAIT.
...MY HEAD HURTS.
MINE TOO.
HERE, WANT A SUGAR PILL?

xkcd.com

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The organizations listed above have aims similar to those of the Committee for Skeptical Inquiry but are independent and autonomous.
Representatives of these organizations cannot speak on behalf of CSI. Please send updates to Barry Karr, P.O. Box 703, Amherst NY 14226-0703.
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